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Structured by a three-dimensional learning theory model, an experimental teacher education project was designed to develop creativity in elementary school children. In this model, the interaction of standard curriculum and 23 project-oriented teaching strategies produced the components of productive-divergent thinking: fluency, flexibility, elaboration, originality, curiosity, risk-taking, and complexity. The National Schools Project conducted inservice training workshops at six project school sites to acquaint teachers and school administrators with methods of eliciting these components of creative thought. Ideas generated, classified, and field-tested by project teachers during training constituted the analytic basis for evaluation of training effectiveness. Experience with the pilot project indicates that inservice training should be continued in the operational phase to improve the teacher's familiarity with these progressive educational strategies. Appendices to this report consist of illustrative handout materials utilized during the five general workshops; independent evaluation data collected at three project schools; and a sample copy of "Classroom Ideas for Developing Productive-Divergent Thinking," a collection of teaching ideas. Annotated reference lists classify 93 books and 47 films by grade level, thinking process, teaching strategy, and subject area. (TI)

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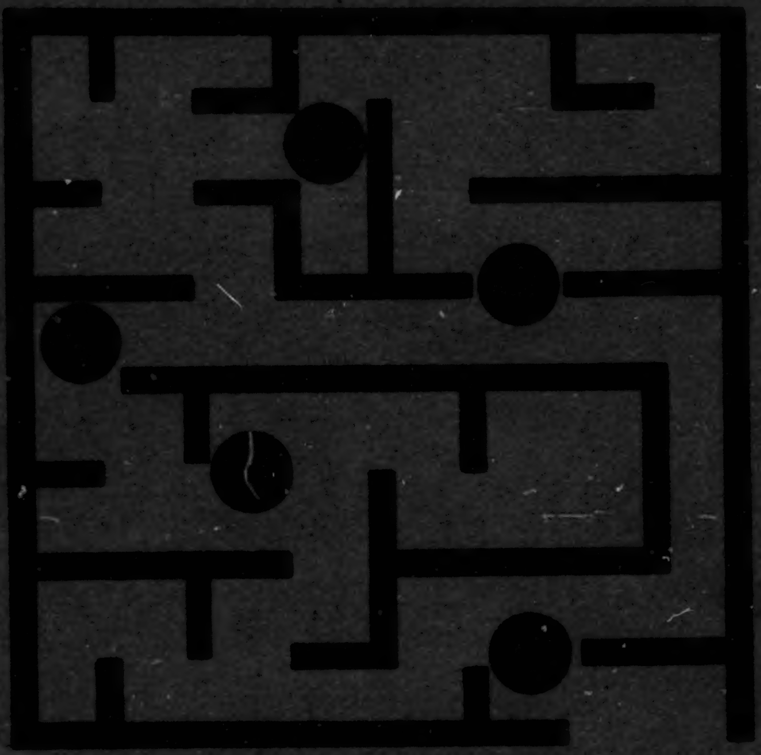
Frank E. Williams



National Schools Project
April, 1968

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U. S. Department of
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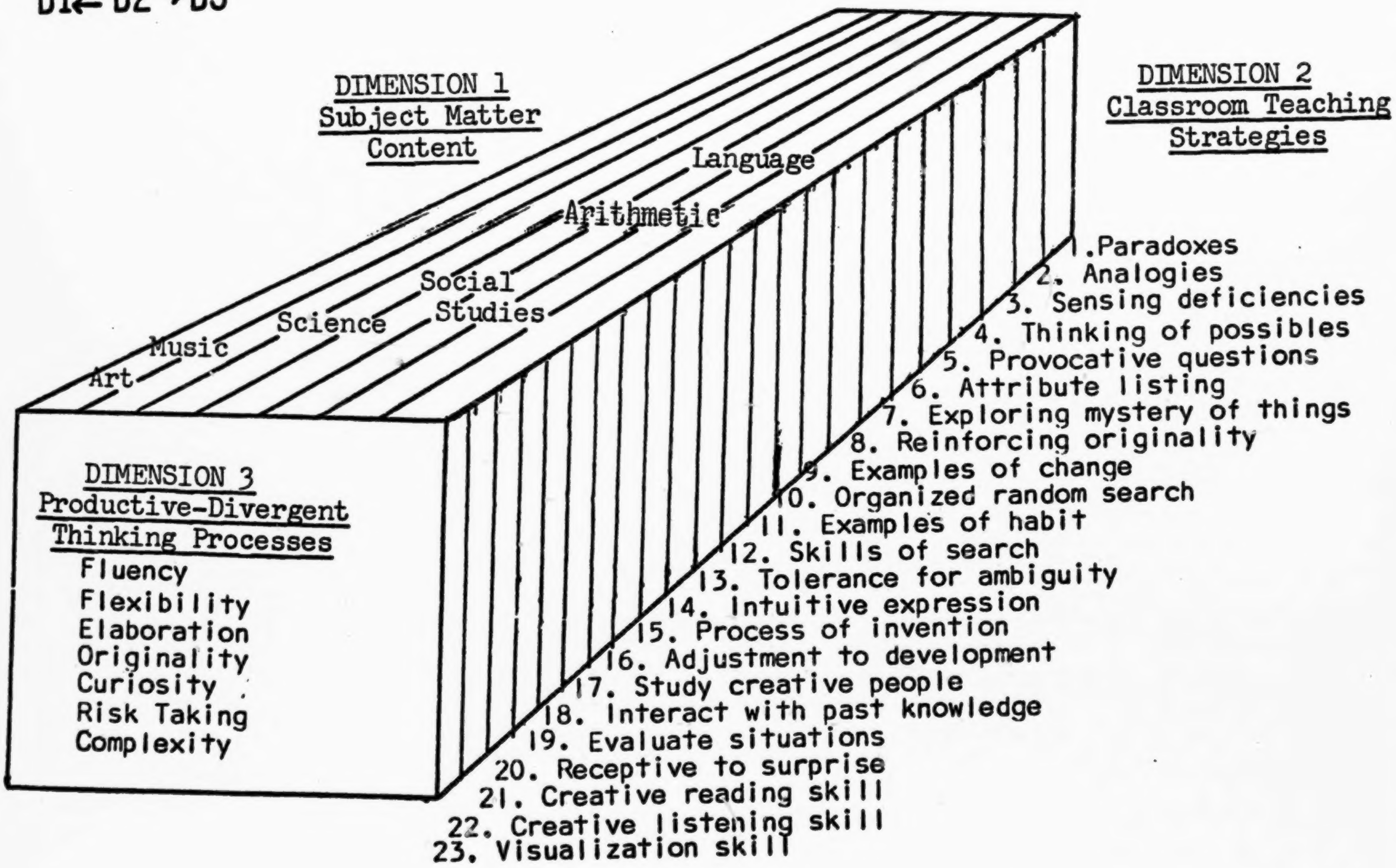
THINKING PROCESSES

NAME	MEANING
FLUENT THINKING	Generation of a quantity Who thinks of the most ideas Flow of thought Number of relevant responses Ability to produce the most in a given time
FLEXIBLE THINKING	Number of different approaches Variety of kinds of ideas Ability to shift categories Versatility to change in focus Detours in direction of thought
ORIGINAL THINKING	Unusual responses Clever ideas Novel but relevant approaches Production away from the obvious Infrequent thought within the group or from one's own repertoire of responses
ELABORATIVE THINKING	Embellishing upon an idea Add necessary details to work out a new thought Production of detailed steps Embroider upon a simple idea or response to make it more elegant Sketch or expand upon things or ideas
WILLINGNESS TO TAKE RISKS	Sets greater goals for greater gains Trys out adventurous tasks Ventures to guess Enjoys activities involving chance
PREFERENCE FOR COMPLEXITY	Ability to handle involved details Likes to toy with intricate ideas Can cope with knotty solutions or problems Challenged by complications "Digs into" difficult problems or solutions
CURIOSITY	Thrives on novel routes or choices Exploratory behavior directed toward acquiring information Examines things and ideas Preference for the unknown or the unfamiliar Capacity to wonder about things which may lead somewhere

MODEL FOR TEACHING PRODUCTIVE-DIVERGENT THINKING

D1⇄D2→D3


DIMENSION 1
Subject Matter Content
Language
Arithmetic
Social Studies
Science
Music
Art
DIMENSION 2
Classroom Teaching Strategies
1. Paradoxes
2. Analogies
3. Sensing deficiencies
4. Thinking of possibles
5. Provocative questions
6. Attribute listing
7. Exploring mystery of things
8. Reinforcing originality
9. Examples of change
10. Organized random search
11. Examples of habit
12. Skills of search
13. Tolerance for ambiguity
14. Intuitive expression
15. Process of invention
16. Adjustment to development
17. Study creative people
18. Interact with past knowledge
19. Evaluate situations
20. Receptive to surprise
21. Creative reading skill
22. Creative listening skill
23. Visualization skill
DIMENSION 3
Productive-Divergent Thinking Processes
Fluency
Flexibility
Elaboration
Originality
Curiosity
Risk Taking
Complexity

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ACKNOWLEDGEMENTS

The data which has been collected and dissiminated under the name of the National Schools Project during the term of this contract far exceeded our expectations, and many more people became involved with and contributed toward this work than was initially anticipated.

First, we are indeed indebted to the two main sources of financial support for the National Schools Project. To the Bureau of Research, Division of Elementary and Secondary Education of the United States Office of Education and our assigned Project Officer, Miss Veryl Schult, we are of course indebted. Under our Contract No. OEC 3-7-061619-0392 it was possible to purchase media materials for use in project schools and funds were made available for consultants, travel, and an administrative assistant, who helped in disseminating plans and materials between project schools. To Mr. DeWitt Wallace, Co-chairman and Co-editor of THE READER'S DIGEST, Pleasantville, New York, who has contributed generously over the past three years for the salary of the project's principal investigator, we are deeply indebted since he made it possible for the Macalester Creativity Project to come into being and its office to participate in this research activity. Certainly this financial support from contract funds of the Office of Education and from Mr. Wallace's personal interest and contributions for the development of creativity in school classrooms aided tremendously toward our work of conducting teacher in-service training workshops throughout the country and analyzing their effectiveness in terms of behavioral changes of teachers and their classroom practices as well as changes of thinking behaviors of their pupils. Also, all of the cooperating project school districts in some way contributed additional financial support toward the overall success of this work. Each project school district contributed financially to the project in various ways; such as, release time for training teachers, consultants honoraria, evaluation studies of training effectiveness and pupil change, materials and equipment for project schools, special teacher institutes or workshops, and travel and expenses for local school representatives to attend national creativity workshops, institutes or meetings with which the project was affiliated in Utah, Minnesota and New York. Without this tremendous support from all people and agencies together this research project could not have accomplished what it was able to do in such a short period of time.

Much hard work beyond the normal duties of a school administrator has been done by all of the project school principals who planned and organized groups of teachers for these workshops and in some cases who conducted their own follow-up teacher in-service training sessions between workshops. The project is indeed indebted to these principals at each project site. Mr. Robert Phillips, Medford, Oregon; Mr. Lynn Stoddard, Clearfield, Utah; Miss Irma Henry, Edwardsville, Illinois; Miss June Otterness, Hutchinson, Minnesota; Sister Paul Mary, Saint Paul, Minnesota; and Dr. Daniel Weppner, Williamsville, New York.

For the very well-known and professional staff of consultants who contributed so much in helping to conduct training sessions at project schools, we are indebted to Dr. Sidney Parnes, Buffalo, New York; Mrs. Margaret Woods, Seattle, Washington; Dr. Richard Suchman, Palo Alto, California; Mr. Robert Eberle, Edwardsville, Illinois; and Dr. Everett Keach, Minneapolis, Minnesota. Many long hours for training and consultants with teachers were donated to the project by Dr. Sidney Parnes and Mr. Robert Eberle as they worked bi-monthly with teacher in-service training at the Williamsville, New York, and Edwardsville, Illinois, project schools.

For the long and arduous work of classifying, organizing, typing, and reproducing project teachers' IDEA Innovation Report Forms, we are indebted to the Administrative Assistant of the Macalester Creativity Project, Mrs. Marie Panger; the project's secretary, Mrs. Mary Jane Robinett; and Mrs. Bernice Bleedorn at the University of Minnesota who accomplished the task of dissemination and conducted some teacher training media demonstration sessions at certain project school sites.

To all of the teachers, curriculum supervisors, and district superintendents who were involved in training or administratively supported the work of this project we are deeply indebted to the Medford Public Schools, District 549C and the Oak Grove School faculty, Medford, Oregon; Davis County School District, and the Hill Field Elementary School faculty, Farmington, Utah; Edwardsville Community School District No. 7, and the LeClaire School faculty, Edwardsville, Illinois; Hutchinson Independent School District No. 423, and the Hutchinson Elementary School faculty, Hutchinson, Minnesota; the Archdiocesan Parochial Schools of Saint Paul, and the Saint Leo's School faculty, Saint Paul, Minnesota; and Williamsville Central School District, and the Mill Middle School faculty, Williamsville, New York.

It is impossible to include the long list of the 176 teachers who, at the six project schools, contributed so much in terms of time, effort, their own personal interest, and innovative ideas which were shared by all. We are most indebted to these teachers who through their own individual involvement in the project by professional growth and competency will continue to affect the learning encounters of pupils toward a better understanding and development of their creative potential.

Frank E. Williams
Principal Investigator
Macalester College

PREFACE

The project reported on herein consists of three parts which were outlined as end products in the initial proposal. These are as follows:

Part I will outline the training program of workshops conducted at each project school site, discuss the rationale and description of teacher in-service training including the theoretical model designed by the principal investigator upon which the project was predicated, present an analysis of data used in evaluating the effectiveness of such training, with the inclusion of a summary and implications. The theoretical model is shown on the inside of the front and back cover as fold-outs. Both of these fold-out cover pages conveniently assist the reader in interpreting those thinking processes (front fold-out) and teaching strategies (back fold-out) which comprise two dimensions of this model. Since this model was an integral part of teacher in-service training as well as classifying teacher generated ideas and media devices to be used in the classroom for developing creative thinking of pupils, it became the major theoretical component for the project.

Part II presents an annotated bibliography of media instructional materials (books and films) which were located by project personnel as well as by trained teachers as classifiable across the project's theoretical model to be used in school classrooms for purposely programming the pupil's creative thinking.

Part III is an appendices section consisting of three sections. Appendix A contains illustrative handout materials developed for teacher in-service training at all project schools. Appendix B presents other research data compiled at three project schools where independent evaluative studies were conducted. Appendix C presents a sample copy of the CLASSROOM IDEAS FOR DEVELOPING PRODUCTIVE-DIVERGENT THINKING book which was designed and produced by the project as a means for disseminating workable and field-tested ideas by trained teachers. The purpose of such ideas was for developing the creative thinking processes of pupils using certain prearranged teaching strategies throughout the on-going elementary school program.

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PART I

PRESENTATION OF THEORETICAL MODEL, RATIONALE AND PROGRAM DESCRIPTION, EVALUATION OF TEACHER IN-SERVICE TRAINING, AND SUMMARY

CHAPTER I

A NEW SCHEME FOR DEVELOPING CREATIVITY IN ELEMENTARY SCHOOL CLASSROOMS

If one surveys the literature relating to creativity one finds a predominance of writers and researchers defining it in a number of diverse ways. However, throughout this great diversity an amazing consistency does occur, especially with respect to certain descriptive terms used in attempts to explain the creative process. Throughout all definitions the terms hypothesizing, combining, synthesizing, designing, associating, imagining, translating, relating, sensing, inventing, or transforming will undoubtedly appear. For example, creativity has been defined by many as the combining of elements to form a new synthesis of ideas, products, or acts. Torrance's process definition includes three ways in which people behave in order to be creative. The first way consists of the process of sensing deficiencies, problems, or missing elements. The second way is that of formulating hypotheses by making guesses or asking provocative questions. And the third way is through the process of testing, revising or modifying elements in new ways. Others have defined creativity as relating previously unrelated things; combining ideas or materials in new forms; converting the accustomed to the unaccustomed; translating to the relevant that which has seemingly appeared irrelevant; or transforming past knowledge, experiences, or materials to produce unique responses or products.

From an abundance of research on the creative person and the creative process, it becomes evident that the three main ingredients of an operational definition for creativity are information and knowledge; the use of certain mental abilities which come under cognitive processes, productive and evaluative thinking; and communication skills for relating one's creation to others.

The previous work of the author has been directed toward the study of the structure of educative processes which may provide clues as to how teachers might better program creative learning encounters for classroom pupils. Certainly the educative process does deal and always has in the past dealt with the task of imparting information and teaching the skills of communication. Therefore, these two basic ingredients of creativity have been accomplished at least with some degree of effectiveness in most school classrooms. Post Sputnik education has shifted away from memorization, storage, and recall into the development of cognitive processes and perception so that teachers are becoming competent in accommodating these talents of pupils in the classroom. What is lacking in considering the inclusion of these basic ingredients of creativity in classroom situations are certain mental processes in the areas of productive and evaluative thinking. There are some educators who would agree that teachers have done well in promoting critical and evaluative thinking at the expense of providing opportunities and encouraging productive thinking. If these observations of teachers' behavior in school classrooms are valid, then, the implication is that teachers should begin to concentrate more upon productive thinking since this is an area that has been heretofore neglected or at least left to chance.

Now as one pursues recent studies on modes of thinking of the developing child one finds practically the same descriptive terms which have been used in defining creativity likewise appearing in explanations of theories of thinking. For example, in Piaget's monumental accounts of intellectual development and his explanation of the growth of thinking during childhood and adolescence he uses the terms hypothesizing, imagining, synthesizing, translating, evaluating, and associating. These are described as processes of thinking which occur within his concrete and formal operational stages. Hughes and Miller in their "Hierarchial Schema of Higher Mental Processes" list the terms inferring, judging, hypothesizing, abstracting, inventing, creating, synthesizing, and generalizing within their four levels of thinking in order from simple to complex. Bloom's Taxonomy of the Cognitive Domain also lists translating, extrapolating, synthesizing, designing, evaluating and deriving as ways in which people think. Guilford's Model of Human Intellect likewise contains the terms cognition, divergent-production and evaluation, as well as transforming, redefining, sensing, visualizing, elaborating, originating, and improvising as either mental processes of thinking or products produced out of such thinking behaviors. Thus, it is recognized that there are common elements as descriptive terms used concurrently and synonymously in attempts to define creativity as well as in attempts to describe ways in which people think. From this rather simple analogy, then, the approach taken by the author in designing and conducting this project has been to place creativity in perspective with thinking and to concentrate upon those mental processes which research indicates contribute the most toward the development of creative thinking.

There have been two rather widely accepted, but differing, approaches in explaining thinking. One approach is taxonomical and it holds that the development of thinking lies within some sequential classification of "stages" or "phases" of mental development. The theories of thinking already briefly discussed; namely, Piaget's stage theory, Bloom's taxonomy, Hughes and Miller's hierarchial schema are examples of this approach along with the work of Bischof, Sullivan, Isaacs, Duncker, Wertheimer, and others. Another approach has been morphological, and deals mainly with the interaction of various parameters of thinking. Guilford's structure of human intellect is one example of this approach as well as some of the earlier studies of human development as espoused by Pestalozzi and Froebel. Instead of considering discontinuous stages of mental development as in the former approach of taxonomy, some researchers have argued for the concept of continuity or interaction between environment, maturation, and experience as in the latter approach of morphology. It is this latter approach that the author used in formulation of a model for the development of productive-divergent thinking upon which this project was based.

One of the most prevalent questions being asked by educators today is how to bring creative thinking about within the total on-going school program. Being cognizant of this need, the project was experimenting with a new scheme in the form of a three-dimensional theoretical model designed for the teacher to purposefully program learning situations in order to develop the creative thinking potential of elementary school pupils across all basic disciplines of the regular curriculum.

The National Schools Project was designed as an applied research study in order to introduce creative thinking as an innovation in education. This was a pilot project to train entire staffs of selected elementary schools throughout the country on methods, procedures, and techniques for developing creative thinking among young children. The project was predicated upon and teacher in-service training was conducted across a theoretical model, see Figure I.

The model portrays a three-dimensional cube as a morphological approach; each side consisting of teaching strategies, subject areas of an elementary school curriculum, and productive-divergent thinking processes. As can be observed in Figure I, the subjects of the curriculum (Dimension I) are shown to interact with twenty-three classroom strategies or teaching styles (Dimension 2) to produce seven thinking behaviors of pupils (Dimension 3) essential for developing creative potential. The front and back cover fold-outs of this report list and indicate short working definitions for each of the teaching strategies (back cover fold-out) and thinking processes (front cover fold-out) which make up these two dimensions of the model.

The model provides a working structure for in-service training and curriculum modification. No drastic changes are needed in the curriculum or classroom practices that innovative teachers are not already implicitly doing. But with training in the use of the model, all teachers at every grade level can discover ways to extend learning and thinking processes beyond those existing in most classrooms. The model likewise provides the teacher with a systematic analysis of classroom practices so that no longer is the development of creative thinking left to chance nor neglected.

That dimension consisting of the twenty-three teaching strategies (Dimension 2) was devised empirically from many studies of how all good teachers operate in school classrooms. It provides every teacher with a repertoire of styles and a procedural checklist for a multitude of efforts to purposely program the pupil's productive-divergent thinking. A rationale for the use of a multitude of strategies by the teacher is based upon the premise that the more ways a pupil is caused to think, the better adapted he or she becomes to thinking. Strategies become a means to an end and provide the teacher with a number of courses of action, routes, or paths along which the pupil is caused to think. Strategies can also become cues which teachers can use to trigger creative thinking processes.

MODEL FOR TEACHING PRODUCTIVE-DIVERGENT THINKING

D1⇄ D2→D3

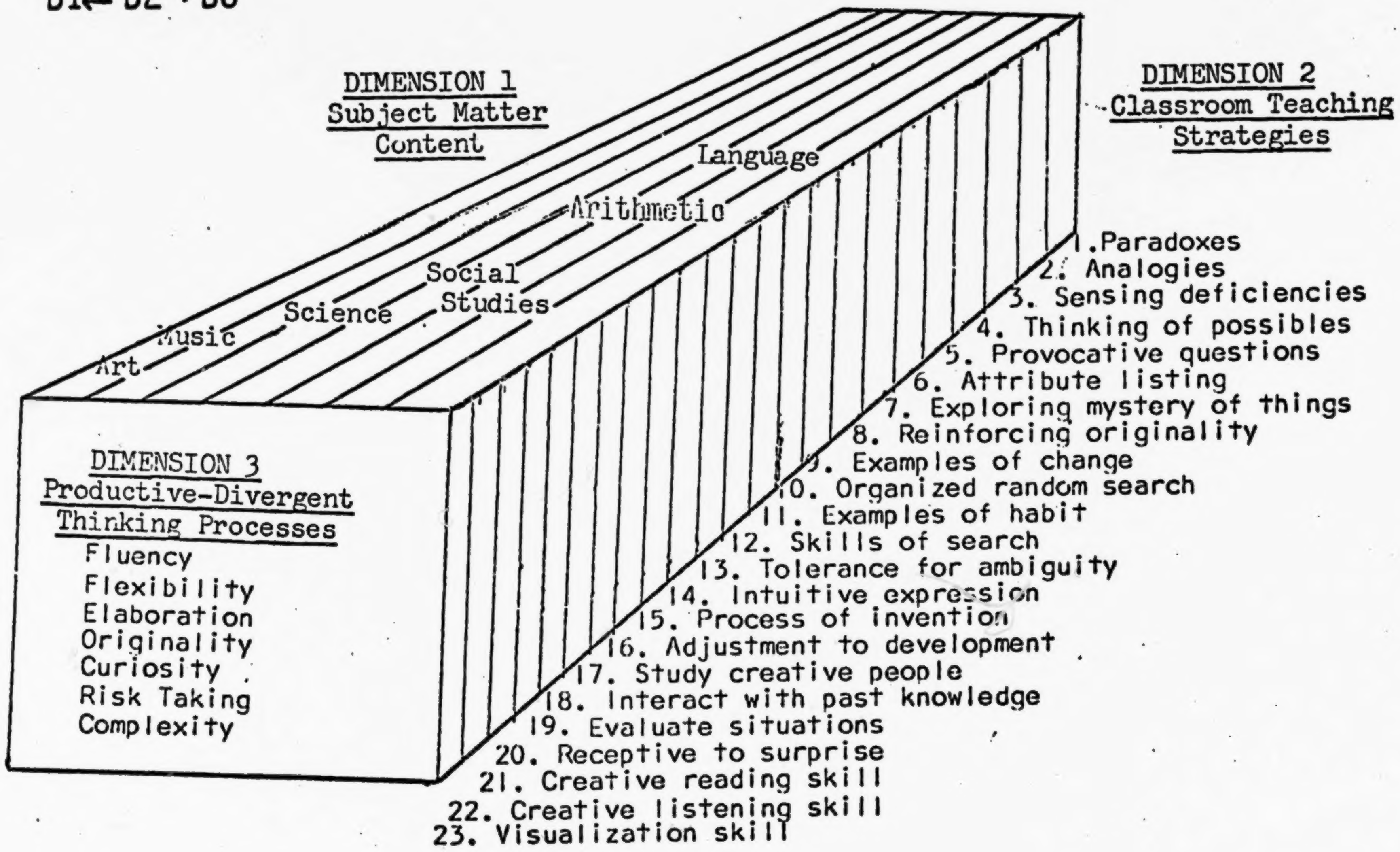
DIMENSION 1
Subject Matter
Content
Art
Music
Science
Social
Studies
Arithmetic
Language
DIMENSION 2
Classroom Teaching
Strategies
1. Paradoxes
2. Analogies
3. Sensing deficiencies
4. Thinking of possibles
5. Provocative questions
6. Attribute listing
7. Exploring mystery of things
8. Reinforcing originality
9. Examples of change
10. Organized random search
11. Examples of habit
12. Skills of search
13. Tolerance for ambiguity
14. Intuitive expression
15. Process of invention
16. Adjustment to development
17. Study creative people
18. Interact with past knowledge
19. Evaluate situations
20. Receptive to surprise
21. Creative reading skill
22. Creative listening skill
23. Visualization skill
DIMENSION 3
Productive-Divergent
Thinking Processes
Fluency
Flexibility
Elaboration
Originality
Curiosity
Risk Taking
Complexity

FIGURE I

That dimension consisting of the seven thinking processes (Dimension 3) was deduced from the theoretical studies of traits and characteristics of highly creative individuals, adults as well as children, and what is known about how they think and behave. Because of the numerous thinking factors which contribute toward developing creative potential and the complexity involved if all of these were considered, only those which make up divergent thinking were included in this model for the purpose of simplification. Divergent production factors are certainly the most crucial and probably have received less attention in classroom practices. Hence, the model is intended to focus upon those thinking processes that undoubtedly are most vital and yet have been seriously neglected in classroom teaching. These become goals or objectives and are ends in themselves.

That dimension consisting of the various subjects of the curriculum (Dimension 1) is fairly well established and, therefore, fits very neatly into the kinds of things already being done in school classrooms. Imparting knowledge about subject matter has been and still is one of the basic purposes of education; but certainly should not be the major goal or objective of education. Emphasis with regard to subject matter is intended by this model to be relegated as a means to an end, not an end in itself. Pupils cannot think nor teachers cannot cause them to think in a vacuum, but subject matter content should become the vehicle which the teacher uses to lead the child toward cultivating and promoting thinking behaviors. The curriculum, unit or lesson provides the teacher with the "stuff" to cause the pupil to think about.

As teachers receive training in developing and classifying their own teaching practices across the dimensions of the model they learn how to become diagnosticians bridging the gap between a theoretical position, the child, classroom practices, and climate favorable for creative thinking. Research on thinking and learning processes indicates that teachers need to consider more effective ways to implant knowledge so as to cause pupils to think in those unaccustomed categories which make up creativity. The model itself is designed to provide some of the ways in which this might be done by the classroom teacher. Through its use, project teachers were encouraged to experiment with fresh approaches for helping pupils to think productively and creatively as they pursued subject matter content. The purpose of education then in applying the model to classroom practices was to teach children how to like to think, not just to learn.

The National Schools Project is only one small attempt to provide teachers with a large repertory of tested ideas based upon a specific theory model as a rationale from research findings in order to develop productive-divergent thinking. The one objective of the project was to build a flexible approach to imparting knowledge in school classrooms so that teachers are able and willing to innovate through the use of a variety of strategies for the purpose of developing creative thinking behaviors. Perhaps if teachers understand not only why but how to stimulate creativity among all pupils, the task of implementing this complex process as an innovation in school classrooms may more easily become an eventuality.

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CHAPTER II

RATIONALE, OUTLINE AND SCHEDULE OF TRAINING PROGRAMS CONDUCTED AT PROJECT SCHOOLS

This chapter will contain three parts. The first part presents a rationale of the training program which was conducted at project schools during workshops by the principal investigator and by consultants and/or project school staff. The second part essentially outlines the agenda of training topics presented at each project school site. Since training at each school posed different problems, there developed during the length of the project unique procedures which required flexible training schedules at each site. These are outlined in the third section of this chapter.

The purpose of this chapter is to provide a basic framework or structure for other teacher in-service training programs in the area of multiple talents including creative and productive thinking. It provides a suggested format or prospectus of training for classroom teacher groups along with examples of handout materials (see Appendix A) designed for use in illustrating key points, theories, or concepts presented and discussed during training. It is intended that this chapter with the inclusion of handouts will provide a guide for those desirous of conducting other in-service training programs.

Rationale for Teacher In-Service Training -- Theory versus Practice

Teacher in-service training was planned and conducted around a comprehensive program for elementary classroom teachers and school administrators at six project school sites. These project schools were located in Medford, Oregon; Clearfield, Utah; Edwardsville, Illinois; Hutchinson, Minnesota; Saint Paul, Minnesota; and Williamsville, New York. The rationale for such a training program was based upon several recent studies of teacher competency in dealing with the problem of including creative thinking in the on-going school program. Abraham (1967) reports from interviews with teachers that hackneyed discussions about education for the development of creative thinking have dealt primarily with identification, grouping, scope and sequence, enrichment and acceleration and are "old hat" to most. He, however, continued to point out that most classroom teachers are not yet prepared or trained to cope with the problems of discriminating between convergent versus divergent thinking; involved concepts regarding the probable range of expanding intellectual talents to include creative thinking; or developing a repertoire of teaching styles which optimally allow pupils to progress through a hierarchial schema from simple to complex levels of thinking. Our experience with conducting in-service training programs for teachers indicates that this finding is very true indeed.

The principal investigator of the project designed and experimented with using an inventory of questions about applied research findings, studies, and materials all reported or developed in the past eight years dealing with creativity having particular relevance to classroom teaching. This compliation of fifty questions called an "Information Awareness Checklist" (Williams, 1966 - shown in Appendix A) asks teachers to respond with either "yes" or "no" depending upon some knowledge or complete lack of knowledge about each question. For example, there are a cluster of questions dealing with the tests and teaching materials by Torrance, the models and writings of Guilford, Bruner, and Bloom; reports of Piaget's findings; the development of teaching materials by Suchman, Crutchfield and Parnes; and general questions about divergent and productive thinking. This Checklist was administered to the one hundred seventy-six teachers of the six project schools at the beginning of training. An item analysis of the responses on the Checklist given at that time revealed that the mean percentage of "no" category responses elicited by this sample of teachers was 59 percent. This indicated that knowledge about more than half of these questions concerning the most recent and important studies and materials relevant to creative thinking was completely lacking among these groups of teachers.

Further analysis of these data obtained by use of the Checklist is indicated in Table I which indicates a rank order of the highest five "no" category questions to qhich the project teachers responded indicating those areas of knowledge about creativity they were least aware of. Table 2 is a rank order of the highest five questions that these participants indicated they were most aware of and gave "yes" category responses for.

By the use of the Checklist it was determined at the beginning of the project that familiarity with research findings and the availability of teaching materials for developing creative potential was seriously lacking among project teachers. Upon analyzing the response items on Tables I and 2, it became evident that specific knowledge about more than half of the research studies on modes of thinking of young children and media devices for developing or enhancing creative potential was unknown to this group. However, these participants were eagerly aware of classroom innovations needed, the desire to change teaching patterns, and the need for new strategies in dealing with creativity. Perhaps the level of favorable attitude and conceptual awareness for change and innovation among these groups of teachers existed because of the initial screening and selection used in the choosing these six project schools across the country. At least the results from use of the Checklist showed these teachers were ready and willing to learn and apply new concepts about creativity in classroom teaching.

Data obtained from the Checklist also provided guidance for the staff in determining what knowledge the participants already possessed and where deficiencies existed. Being cognizant of these immediate areas of need, the project staff then planned a training program accordingly to meet these needs so as not to waste time repeating known information which allowed more time for concentrating upon unknown information. In this manner, a more efficient and expedient training program resulted.

Table 1

Rank Order of Question Items Teachers (N=176) Reported Being Least Aware of On Information Dealing With Creativity

Rank Order	Question Item	Mean Percentage of Teachers Indicating "No" Responses
1	"120" Mental Abilities of Human Intellect (Guilford's studies)	95.0%
2	Torrance and Myers, Teachers Guides and Student Ideabooks	94.0%
3	Bloom's Taxonomy of Cognitive Domains	91.3%
4	Crutchfield Materials on Programmed Instruction for Creative Thinking	89.0%
5	Suchman's Inquiry Development Programs	83.0%

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Table 2

Rank Order of Question Items Teachers (N=176) Reported Being Most Aware of On Information Dealing With Creativity

Rank Order	Question Item	Mean Percentage of Teachers Indicating "Yes" Responses
1	Need information and materials for new innovations in my classroom.	97.0%
2	Science can be taught to develop creativity same as writing.	90.3%
3	Desire to have pupils think divergently.	89.7%
4	Creativity is associated with problem-solving and awareness of differences between elaborative and original pupils.	88.1%
5	Expect pupils to be creative at the same time as learning subject-matter content.	84.3%

The entire series of workshops were divided into two areas of concentration involving various kinds of activities. The first two workshops concentrated upon the area of theory, analysis and implications of research on creativity. The following three workshops concentrated primarily upon the area of application of such research in classroom practices. This dual purpose training program was predicated upon a rationale from many research studies involving teacher competency where more and more emphasis has been placed upon upgrading teachers in order to bring them abreast of new knowledge pertinent to their classroom behavior. We have found in our applied work of "educational engineering" that relevant research studies need to be translated into action programs for the classroom teacher. Latest research findings on learning and thinking must be implemented at the operating level, and teacher in-service training programs be offered in an operationally oriented direction; i.e., from the researchers concern with the what to the teachers concern with the how.

The means for identifying, encouraging and developing creativity across all levels of the educative process is an area that should be examined carefully in terms of new knowledge about thinking modes of classroom pupils from pre-school through adolescence. Recent research findings indicate many new possibilities for programming learning encounters, teacher strategies, and developing classroom materials for developing creative thinking. Such research evidence gives impetus to a new language and innovative techniques which will allow teachers to define and explain what creative thinking is so that they can make attempts to avoid past errors in bringing these processes about in school classrooms.

Isolated attempts at the task of placing research findings into practice in the areas of multiple talents, creativity, and giftedness have been made but much work in this direction still remains. There is a great need to strengthen teachers competencies through training techniques in the use of a whole host of different teaching strategies. Then trained teachers must be given freedom to explore, design and try out on their own different ways of presenting subject-matter content to different kinds of pupils in order to produce results that vary in level and type of creativity.

Even though the workshops attempted first to impart facts and findings from research before applying them, there was no clear demarcation between the theoretical and applied parts of these programs. Throughout the duration of the project research evidence was presented and was immediately followed by implications for classroom teaching. Because the principal investigator and his staff were very sensitive to the plea by teachers for practicality and classroom applications, workshop experiences for the teachers helped to bridge the gap between theory and practice.

Training Agenda

Figure I indicates a topical agenda of the five workshops that were conducted at all project school sites.

FIGURE I

Agenda of Topics Presented During The Five General Workshops Conducted At All Project Schools

First Workshop

Theory: Research on Creativity - Product vs. Process

1. Four Theories of Thinking (Bloom's Cognitive Domain, Hierarchial Schema of Higher Thought Processes, Piaget's Stage Theory, and Guilford's Structure of Human Intellect). See Appendix A, pages "Comparison of Four Theories On The Development of Thinking"; pages "Classification of Creative Activities and Experiences Into the Primary Mental Abilities of Human Intellect"; and pages "Structure of the Intellect".

2. Working definitions of thinking, creativity and multiple talents and their relationship to intelligence. See Appendix , pages "Creativity in Learning".

3. Educational implications of these models as modes of thinking among children and adolescents for the classroom teacher.

Second Workshop

Theory: Research on the Creative Individual - Adults vs. Children

1. Traits and characteristics of highly creative individuals (studies of adults and children). See Appendix , pages "Traits Common to Gifted and Creative Students".

2. Ability vs. aptitude.

3. Assessing creative individuals (adults - children).

4. Discussion of personality, intelligence, achievement, and special aptitude tests for measuring and/or predicting the multiple talents of creativity.

Third Workshop

Application: Applied Research Studies On Developing Creativity In The Classroom

1. A theoretical model for developing productive-divergent thinking in the classroom. See Appendix pages "Perspective of a Model for Developing Productive-Divergent Thinking in the Classroom".

2. Discussion of two dimensions of the theoretical model - Teaching Strategies vs. Thinking Process - as they relate to subject-matter content. See front and back cover fold-outs indicating the model with working definitions of teaching strategies and thinking processes.

Fourth Workshop

Application: Teaching Strategies For Developing Productive-Divergent Thinking Processes

1. Examples of using several teaching strategies for programming thinking processes. See Appendix page "Classification of Question Categories to Cue Various Levels of Thinking Related to Bloom's Sequential Classification of the Cognitive Domain".

2. Actual examples of selected learning encounters developed according to theoretical models of thinking. See Appendix pages "Curriculum Planning Using Hierarchial Schema of Mental Processes and Bloom's Taxonomy".

3. Demonstration lessons applying the theoretical model, for teaching productive-divergent thinking. See Appendix pages

Fifth Workshop

Application: Grade Level Groups Working on Teacher Generated Ideas For Using a Strategy to Develop a Thinking Process.

1. Three grade level groups (primary, middle and upper) were formed and one strategy from the model was selected by the instructor. Many examples of the strategy were presented, and where possible relevant media for use with the strategy were shown and discussed. Then these groups of teachers were asked to brainstorm on a list of situations in one subject area for which the selected strategy could be used in planning a lesson unit. For example, Strategy No. 1, Paradoxes, was discussed with numerous examples presented. The three groups of teachers were then asked to list paradoxical situations in social studies which could be used by them at their respective grade levels. Instructions were given for each group to select a recorder who should make a list of the paradoxes thought of by the group during the time limit given for brainstorming.

2. After fifteen or twenty minutes the instructor, who had rotated across the groups to help them, then asked the teachers within the groups to shift their thinking from divergent to evaluation. The groups were asked to select from their list the best three paradoxes in social studies as those which they felt they wanted to work on further. Differences between divergent thinking during the brainstorm session in order to generate ideas and critical thinking during an evaluation session in order to judge these ideas were pointed out and discussed by the instructor. When all groups had made their selections, each group recorder was asked to read the three best paradoxes chosen by the group. Lists from each group were collected and later duplicated for handout to each teacher. In this manner, all teachers acquired a lengthly list of idea examples for each strategy which could be used at their convenience as they so desired.

3. With the same teachers working in each group, smaller sub-groups were formed comprised of two or three teachers working together on one of the best selected examples of a strategy (paradox) in order to write a unit for teaching a subject (social studies) at their grade level. Each sub-group was instructed to select one thinking process from the model (Dimension 3) as that which they wanted to develop. Having selected this thinking process as their objective, each sub-group designed a teaching unit using the selected strategy example (paradox) as their approach to a learning encounter in a certain subject area (social studies) in order to cause the pupil to think creatively. Within about two hours a number of units were designed by the various sub-groups, and after a short break the same procedure was repeated using a different strategy or subject area. By the end of this workshop the teachers became very familiar with this process of unit planning using the model. It was anticipated that with this experience and background, further independent group work could continue in this same manner at each project school witnout the aid of a consultant under the guidance of the curriculum supervisor or building principal. Teacher groups were encouraged to develop, locate and classify their own ideas and media in accordance with the training they had already received on the use of the model for curriculum modification and planning. (See Appendix A for sample unit designed during on of these training sessions.)

Schedule of Individualized Training Programs at Each Project School Site

During the first two workshops research and theory was implied to be pertinent to the entire subject-matter curriculum. At the beginning of the third workshop, prior to the presentation of the project's theoretical model, each project school staff was asked to select a particular subject area for continued training specialization. In this manner it was then possible to supply each school with media materials and a subject-matter consultant pertinent to that subject area. New materials were demonstrated and teaching strategies developed within the chosen subject area at each school in order to show teachers how productive-divergent thinking could be taught directly through the subject area. As teachers learned how to teach and became comfortable with applying the model in the subject area, they then were encouraged to try out new ideas and media in the other subjects of the curriculum. Figure 2 indicates a list of the project schools with their subject-matter area of specialization for training, the media materials introduced and experimented with, the consultant chosen to work with that school, and the manner in which special training proceeded at each project school in addition to the five general workshops conducted by the principal investigator.

FIGURE 2

Schedule of Special Teacher In-Service Training at Each Project School

I. Oak Grove Elementary School
Medford, Oregon
Mr. Robert Phillips, Principal

Number Trained:
Faculty K -6; 15 teachers, 1 principal, 1 resource supervisor, 1 district curriculum coordinator.
Total - 18

Specialized in Language Arts using:
Applegate's "Let's Write" audio tapes
Peabody Language Development Kits #1 and #2

Consultant: Mrs. Margaret Woods
Seattle Pacific College
Seattle, Washington

Two 1-day Teacher Workshops conducted by Dr. Frank E. Williams and Mrs. Margaret Woods. Bi-monthly faculty in-service seminars conducted by Mr. Robert Phillips, building principal, throughout the 1966-67 school year. Two project teachers attended the 13th Annual Creative Problem-Solving Institute at the State University of New York at Buffalo, New York, June 11-16, 1967, at their district expense. Full paid scholarships were made available to the project by the Creative Education Foundation for attendance of project teachers.

2. Hill Field Elementary School
Clearfield, Utah
Mr. Lynn Stoddard, Principal

Number Trained:
Faculty K -6; 28 teachers, 1 principal, 1 visiting principal, Total - 30

Specialized in Science using:
SRA Inquiry Development Programs
Holt, Rinehart, Winston; SCIENCE, A MODERN APPROACH, Series of books K-6.

Consultant:
Dr. Richard Suchmann
Science Research Associates

Two 1-week pre-school Teacher Workshops conducted by Dr. Frank E. Williams and Dr. R. Suchman. Bi-monthly faculty in-service seminars conducted by Mr. Lynn Stoddard, building principal, during the 1966-67 school year. The district sponsored two-week work sessions for a team of seven project teachers, one per grade level, to develop district framework for creative teaching of basic disciplines during the month of June, 1967. This team of seven project teachers also attended the University of Utah's Fifth Annual Creativity Workshop in Salt Lake City, Utah, directed by Dr. Calvin W. Taylor, June 12-16, 1967, at district expense.

One project teacher attended the 13th Annual Creative Problem-Solving Institute at the State University of New York at Buffalo, New York, June 11-16, 1967, at district expense. A full paid scholarship was made available to the project by the Creative Education Foundation for attendance of this project teacher.

Davis County School District, Utah, our project school's district, has formed a Creativity Committee for exploring barriers to creative learning and elected our project school principal, Mr. Lynn Stoddard, as Committee Chairman. The purpose of the committee is to seek ways to spread efforts of the project school to all elementary schools throughout the district.

3. LeClaire Elementary School
Edwardsville, Illinois
Miss Irma Henry, Principal

Number Trained:
Faculty K -6; 29 teachers, 1 Asst. superintendent,
1 principal, 5 visiting demonstration teachers
Total - 36

Specialized in Language Arts using:
Applegate's "Let's Write" audio tapes
Peabody Development Kits #1 and #2

Consultant: Mr. Robert Eberle
Assistant Superintendent
Edwardsville, Illinois

Three 1-day Teacher Workshops conducted by Dr. Frank E. Williams and Mr. Robert Eberle. Bi-monthly faculty in-service seminars conducted by Mr. Robert Eberle, District Assistant Superintendent of Instruction, during the 1966-67 school year.

This school district chose to evaluate the effectiveness of teacher in-service training by measuring and computing pre and post gain scores of second and third grade pupils in project school classes on the Torrance Figural Test of Creative Thinking, Forms A and B. An analytical study was also conducted on teacher's responses to a descriptive inventory of behavioral changes brought about by in-service training at the project school. These evaluation studies were conducted by means of a small grant from the Illinois Plan For Program Development For Gifted and Talented Students made available to the Edwardsville School District since the project school was a demonstration school under the Illinois State Gifted Program. Data collected and analyzed from these studies are shown in Appendix C.

The project school principal and one project teacher attended the 13th Annual Creative Problem-Solving Institute at the State University of New York at Buffalo, New York, June 11-16, 1967, at district expense. Two full paid scholarships were made available to the project by the Creative Education Foundation for attendance of project teachers.

The project school principal and five project teachers attended the Cooperative Summer Institute on "The Identification and Development of Creative-Productive Thinking" sponsored by the Illinois Plan of Program Development for Gifted Children held at Southern Illinois University for four weeks from June 26 through July 21, 1967. This Institute was directed by Dr. Frank E. Williams along with five consultants of national reputation who participated as guest speakers. Each Institute participant was granted eight quarter hours of graduate credit in Special Education by Southern Illinois University.

4. Hutchinson Elementary School
Hutchinson, Minnesota
Miss June Otterness, Principal

Number Trained:
Faculty K -6; 57 teachers, 1 superintendent, 1 principal, 1 elementary curriculum supervisor, 1 visiting principal
Total - 61

Specialized in Social Studies using:
Project Social Studies K - 6 Curriculum Materials.

Consultant: Dr. Everett Keach
Project Social Studies
University of Minnesota
Minneapolis, Minnesota

Fifteen Teacher In-Service Training Sessions with student demonstration on inquiry development in the social studies were conducted by Dr. Frank E. Williams and Dr. Everett Keach throughout the 1966-67 school year.

Two project teachers attended the 13th Annual Creative Problem-Solving Institute at the State University of New York at Buffalo, New York, June 11-16, 1967, at district expense. Full paid scholarships were made available to the project by the Creative Education Foundation for attendance of project teachers.

The project school principal and one project teacher attended the University of Utah's Fifth Annual Creativity Workshop in Salt Lake City, Utah, directed by Dr. Calvin W. Taylor, June 11-16, 1967, at district expense.

5. St. Leo's Parochial School
Saint Paul, Minnesota
Sister Paul Mary, Principal

Number Trained:
Faculty K - 8; 15 teachers, 1 principal
Total - 16

Specialized in Language Arts using:
Applegate's "let"s Write" audio tapes
Peabody Language Development Kits #1 and #2
Brown's 3M Visual-Linguistic Basic Reading Series
Experimented with Starkweather's assessment instruments for identifying creativity in young children.

5. St. Leo's Parochial School (continued)

Twelve In-Service Training Sessions were conducted by Dr. Frank E. Williams throughout the 1966-67 school year. The project sponsored an experimental evaluative study in one class at this school because of its proximity to the project office in Saint Paul, Minnesota. A combined 3rd and 4th grade class of pupils were tested with the Torrance Verbal Test of Creative Thinking and the Cattell Children's Personality Questionnaire. Scores on these tests were correlated to see if a personality-temperament scale which is machine scored with national norms available could replace the Creative Thinking Test which must be hand scored and is considered very subjective as an assessment device for measuring creative potential. Data and analysis of this study are shown in Appendix C.

Demonstration sessions with St. Leo's students were held at KTCA-TV where video tapes were made using the inquiry development method.

One teacher attended the 13th Annual Creative Problem-Solving Institute at the State University of New York at Buffalo, New York, June 11-16, 1967. A full paid scholarship was made available to the project by the Creative Education Foundation for this teacher to attend.

The project school principal attended the University of Utah's Fifth Annual Creativity Workshop held at Salt Lake City, Utah, and directed by Dr. Calvin W. Taylor, June 12-16, 1967, at district expense. During the 1967-68 school year a follow-up teacher training course was offered by Dr. Frank E. Williams through the Extension Division of the University of Minnesota for the complete faculty of this school.

6. Mill Middle School
Williamsville, New York
Dr. Daniel Weppner, Principal

Number Trained:
Faculty 6th grade; 12 teachers, 1 principal, 1 supervisor, 1 visiting supervisor.
Total - 15

Specialized in Creative Problem-Solving using:
Crutchfield's Productive Thinking Program, Berkeley, California

Consultant: Dr. Sidney J. Parnes
State University College
Buffalo, New York

6. Mill Middle School (continued)

Weekly faculty in-service training was conducted by Dr. Parnes throughout the 1966-67 school year.

This school chose to measure the effectiveness of the teacher in-service training program on its pupils. With a small grant from the Williamsville School District and with the help of the principal investigator, an evaluative study was designed. All sixth grade class pupils in the school were tested pre and post training as an experimental group and matched with sixth grade class pupils at another school in the district as a control group. Pre and post testing was conducted using the Torrance Tests of Creative Thinking, Figural and Verbal, Forms A and B, for all sixth grade pupils at the beginning and at the conclusion of the training. Treatment of experimental subjects included the sixteen booklet series of the Crutchfield Productive Thinking Program. Pre and post test data for this experimental group and control group are presented and analyzed in Appendix C of this report.

This chapter has been an attempt to outline the project's in-service training program for introducing intellectual processes which contribute to creative potential. There remains much to be accomplished since we are only on the very fringe of bringing multiple talents, including productive and creative thinking, to the forefront of playing a major part in classroom teaching. The National Schools Project is only one small attempt to provide teachers with a large repertory of tested ideas and materials based upon a specific theory model as a rationale from research studies in order to develop the pupil's productive-divergent thinking. The one objective of the project has been to sensitize teachers to a flexible approach for imparting knowledge in school classrooms so that they are better able and willing to innovate upon the use of a variety of strategies for the purpose of developing the child's creative thinking behaviors. Perhaps, if teachers understood not only why but how to stimulate multiple talents among all pupils, the task of implementating this complex process in school classrooms may more easily become an eventuality.

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CHAPTER III

DESCRIPTION OF EVALUATION PROCEDURES USED FOR MEASURING TRAINING EFFECTIVENESS

Research studies suggest that there are many kinds of thinking processes which pupils can utilize while simultaneously learning subject-matter content. Evaluative studies need to be conducted for the necessity of analyzing how well teachers can become competent in handling a wide repertoire of teaching strategies which can be used across all subject-matter content in the classroom so that the full range of pupils' learning and thinking processes can be developed completely. Training programs may well become the means for sensitizing teachers to apply research findings which have shown that a consistent use of the full range of mental processes by pupils, including those that make up creativity, requires much conscious effort, knowledge about modes of thinking and many new teaching styles on the part of the teacher. Getting teachers involved in and committed to doing these things in the classroom requires close scrutiny of progress during training and some simple, yet effective way for measuring changes in teaching competency.[1]

As this training project progressed, teachers were encouraged to experiment on their own using strategies and materials within the subjects of the curriculum for developing their own new teaching ideas for ways to cause the pupil to think creatively. Ideas generated and developed by project teachers during training became the means for measuring training effectiveness. Such ideas were field-tested in the teacher's classroom and when declared workable by the teacher were submitted to the Project Office on "Innovation Report Forms" made available to each teacher. If teachers could classify the idea across the three dimensions of the model it was accepted as complete. However, if teachers were unable to classify the idea by strategy(ies) used to develop a thinking process(es) through a certain subject area they were encouraged to submit the idea anyway and a project specialist hired for this purpose made the classification. Figures 1, 2 and 3 which follow are examples of three ideas, one for each grade level, that were selected at random as samples of teaching units which project teachers were able to develop as a result of training. It should be noted that the idea presented in Figure 1, an idea by and for primary grade teachers, is singularly classified according to the model to develop one certain thinking process using only one teaching strategy even though it may be used by the teacher during either periods of art or language arts. Figures 2 and 3 present dually classified ideas since the middle grade idea in Figure 2 is one designed to employ two separate strategies, and the upper grade idea shown in Figure 3 not only suggests three strategies of approach but may also be used to evoke two thinking processes.

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[1] Williams, F. E. "Teacher Competency In Creativity", ELEMENTARY SCHOOL JOURNAL, Vol. 68, No. 4, January, 1968.

K - 2nd

To Develop: Fluent Thinking

Through: Language Arts - Art

Using: Teaching Strategy
No. 2 - Analogies

The teacher asked the children to compare similarities between seemingly different things. Ideas given by the children were either shared orally and/or recorded in "Our Imagination Scrap Book". They were asked, for example: "In how many ways are a spoon and a car alike, or a dish like a clock?

Their similarities were discussed, listed by the teacher on the blackboard, and finally the children copied and illustrated these likenesses in the "Imagination Scrap Book".

Children became more fluent in producing ideas by noting likenesses between objects. A car and a spoon at first sight seem to be very different but first graders can see similarities if teachers help them.

One teacher got the following responses to the spoon-car analogy from her first grade class:

Both can be used for carrying.
Both have very shiny and slick spots.
Both can be used for mixing - one mixes food
  and the other mixes strangers.
The car door handle is spoon-shaped.
Reflections can be seen in clean spoons and
  in hub-caps.
You can make noises with both objects.
Neither of the two is self-operating.

FIGURE I

To Develop: Flexible Thinking

Through: Arithmetic

Using: Teaching Strategies
No. 9 - Examples of Change
No. 10 - Organized Random Search

After showing the film, "A Scrap of Paper and a Piece of String"* each pupil was given a piece of colored 9" x 12" manila paper, a long piece of string, and a pair of scissors. The teacher said, "By using just this material, devise a different way of expressing division into known increments. Try to think of a variety of ways these materials could be rearranged for showing the division of time and space." They were told the dimensions of the paper. These are some of the different kinds of things which were produced.

> One child made a yard measure of the string by tying knots at 3" intervals. Exact 3" distances were obtained by dividing the known dimensions of the paper.
>
> Another child depicted the days of the week by tying knots in the string for each of the days. Sunday was represented by a very large knot.
>
> A third child cut the string into increments of 12's and 6's for measuring space in foot and half-foot intervals.
>
> Another cut the paper into small squares of determined area to use in measuring space.
>
> Another folded the colored paper to illustrate division into halves, thirds and fourths.

*"A Scrap of Paper and a Piece of String", 6 minutes, color; produced by John Korty for NBC and released through Contemporary Films.

FIGURE 2

Upper

To Develop:	Flexible Thinking Preference for Complexity
Through:	Social Studies - Language Arts
Using:	Teaching Strategies No. 5 - Provocative Questions No. 10 - Organized Random Search No. 19 - Evaluate Situations

The teacher asked the class to think of all the different meanings that the word "charge" might bring to their minds. The class was divided into three teams and one pupil from each team was selected to act as recorder to write down the ideas of his team.

After the "brainstorming" sessions, all of these ideas were placed on the front blackboard and the class was asked to determine the number of categories into which their ideas could be placed. Some of the categories they decided on were science, defense, economy, etc. Finally, the class began to realize the relative complications of this word and the question was posed: "Could we easily remove this word and all of its connotations from our language?"

As a result of this exercise the class felt this word involved many different and intricate meanings in our language and society. The teacher then asked whether or not they felt that primary children should become acquainted with this word. The class agreed that younger children should become acquainted with its various meanings. The teacher then asked for suggestions of how they could "dig in" to help on this problem. The class decided to make illustrations of the various categories of the word that they had thought of and later asked for permission to visit primary classes to share some of their insights.

FIGURE 3

After receiving a number of such reported ideas by teachers from the six project schools, these were duplicated and disseminated on back to all teachers in the form of the CLASSROOM IDEAS FOR DEVELOPING PRODUCTIVE-DIVERGENT THINKING book (See Appendix C for sample of this book.) Every teacher of the project received an initial copy of this book in January, 1967, and three supplemental sets of ideas to add to this book in March, May and September of that same year. These books were produced and financed by funds from the project and provided the means for disseminating teacher generated and field-tested ideas to all participating teachers in the project.

An analysis of these ideas, likewise, became the data which were used to evaluate teacher in-service training effectiveness. Classification of the ideas across each of the dimensions of the theoretical model; namely, ideas for developing one or more of the seven thinking processes (Dimension 3), using either one or combinations of several of the twenty-three teaching strategies (Dimension 2), through one or more of the six separate subjects of an elementary school curriculum (Dimension 1) provided three types of evaluation. In-service training equally emphasized the use of all dimensions of the model in teachers' classroom practices and teachers were shown how the individual elements comprising each dimension provided a checklist for appropriately programming learning encounters so as to develop the pupil's full range of creative potential. Hence, the respective elements of each dimension were analyzed closely as training proceeded in terms of those utilized by teachers in their developed and reported ideas.

Evaluating Thinking Processes

The first type of analysis of teacher generated and field-tested ideas was conducted across the seven processes of productive-divergent thinking which comprise Dimension 3 of the model. Table I lists these seven thinking processes in descending order of total number of ideas reported throughout training for each, classified by grade level for three consecutive intervals of training.

An analysis of these data appearing in Table I indicates that even though the seven thinking processes were equally emphasized during training as all contributing toward the development of creativity, teachers were not developing all of them in their classroom practices at an equal rate. For example, these data show that a deficiency of ideas existed for developing fluent thinking, complex thinking, and risk-taking behaviors among classroom pupils.

As Table I shows, ideas to develop curiosity had the highest total. Ideas to develop originality were second, and ideas to develop flexibility were third. Next, in descending order, were ideas to develop elaboration, fluency, risk-taking behaviors, and willingness for complexity. Ideas for developing complexity and risk-taking stood the lowest. Over twice as many ideas were generated and reported for developing curiosity and originality as for developing complex thinking and risk-taking, even though each of these divergent-thinking processes is important to develop creative potential.

TABLE I

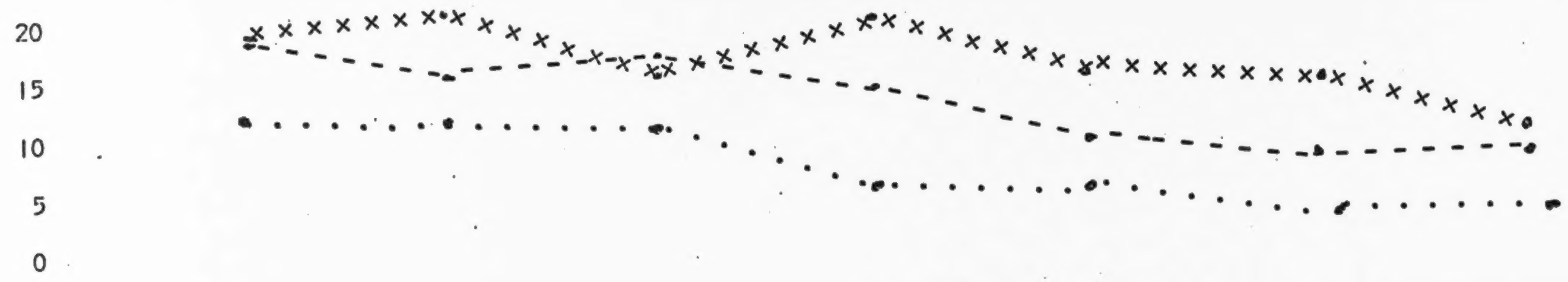
Ideas Submitted By Partially Trained Teachers For Developing Each of the Productive-Divergent Thinking Processes During Three Intervals Of Training By Grade Level.

	To Develop Curiosity	To Develop Original Thinking	To Develop Flexible Thinking	To Develop Elaborative Thinking	To Develop Fluent Thinking	To Develop Risk Taking	To Develop Complex Thinking
Primary Grades (K-2)							
Sept.- Dec., 1966	15	13	19	11	13	5	2
Jan. - Mar., 1967	18	9	8	14	8	8	4
Apr. - June, 1967	15	10	8	14	7	6	6
	48	32	35	39	28	19	12
Middle Grades (3-4)							
Sept. - Dec., 1966	19	20	13	6	3	3	4
Jan. - Mar., 1967	7	7	8	7	8	3	4
Apr. - June, 1967	8	9	10	5	7	3	3
	34	36	31	18	18	9	11
Upper Grades (5-6)							
Sept. - Dec., 1966	17	15	11	7	7	4	8
Jan. - Mar., 1967	31	45	29	37	27	30	21
Apr. - June, 1967	13	12	14	9	7	8	8
	61	72	54	53	41	42	37
TOTALS							
Sept. - Dec., 1966	51	48	43	24	23	12	14
Jan. - Mar., 1967	56	61	45	58	43	41	29
Apr. - June, 1967	36	31	32	28	21	17	17
GRAND TOTAL	143	140	120	110	87	70	60

TABLE I - Continued:

Mean Number of Ideas Submitted During Each Actual Month of Training

	To Develop Curiosity	To Develop Original Thinking	To Develop Flexible Thinking	To Develop Elaborative Thinking	To Develop Fluent Thinking	To Develop Risk Taking	To Develop Complex Thinking
Sept. - Dec., 1966	12.7	12.0	11.7	6.0	5.7	3.0	3.5
Jan. - Mar., 1967	18.6	20.3	15.0	19.4	14.3	13.6	9.7
Apr. - June, 1967	18.0	15.5	16.0	14.0	10.5	8.5	8.5



Legend

. . . . . September - December, 1966 (4 actual months of training)
x x x x x January - March, 1967 (3 actual months of training)
- - - - - April - June, 1967 (2 actual months of training)

Likewise, teachers reported many more ideas for developing curiosity and originality as for developing elaboration, flexibility and fluency. This imbalance in ideas to develop these thinking processes occurred in spite of the fact that during in-service training no one process was emphasized more than any other. All seven thinking processes were clearly defined and treated as equally important in contributing to creativity in the classroom. On the basis of the ideas reported it is apparent that elementary school teachers do not consider the development of complex thinking and risk-taking behaviors as important as developing curiosity and originality.

It is worth noting, however, that teachers in the primary grades (K through 2nd) contributed more ideas for developing six of the seven thinking processes than teachers in the middle grades (3rd and 4th). There were only a few more ideas submitted by middle grade teachers for developing original thinking than submitted by primary grade teachers. An analysis of ideas by grade levels confirms several other research studies on creativity in the middle grades, particularly at the fourth grade, where these data indicate that those project teachers were not developing fluency, elaboration or risk-taking behaviors of pupils nearly as much as primary grade or upper grade teachers. Upper grade teachers (5th and 6th) far exceeded any of the other grade teachers in submitting ideas for developing all seven thinking processes. Of the ideas submitted for developing risk-taking and complexity, the number in the upper grades was two to four times the number in primary and middle grades.

One notable observation of Table I is the descendable number of ideas which all teachers reported for developing elaborative, fluent, complex thinking and risk-taking behaviors among pupils. There were over two times as many ideas generated and reported by project teachers for developing curiosity and original thinking than there were for developing complex thinking and risk-taking, even though each of these divergent thinking processes equally contribute toward developing creative potential. Likewise, curiosity and originality each contained many more reported ideas than for developing flexibility, elaboration and fluency. This imbalance of reported ideas for developing each of the thinking processes occurred in spite of the fact that during in-service training no one process was emphasized over any of the others. All were operationally defined and treated as equally important for fostering creative thinking in the classroom.

It should be noted that the three time intervals of reporting these data were arbitrary, and a valid interpretation of submission rate of ideas must take into account the differences in actual training time throughout these intervals. The first interval of training (September - December, 1966) consisted of four months and actual training time was likewise spread over a period of four months. The second interval (January - March, 1967) consisted of three months and actual training was spread over three months, but the last interval (April - June, 1967) only consisted of two months of actual training due to schools being closed on or near the first of June even though ideas continued to arrive and were processed throughout that month. Therefore, the continuation of Table I (page 28) presents mean submitted number of ideas throughout these intervals in order to take care of these differences in actual training time. As seen in the graph of Table I many more ideas for developing all of the thinking processes were reported during the last two intervals of training January - March, 1967, and April - June, 1967, as compared to the earlier interval of training.

The graph at the bottom of Table I shows a comparison of mean number of submitted ideas during the first training interval to those submitted during the last training intervals. The earlier curve indicates peaks and troughs showing that the thinking processes of curiosity, originality and flexibility were more predominently being developed than elaboration, fluency, curiosity and risk-taking. As work with teachers and training continued, it will be noted how teachers began to learn to develop these four latter thinking processes by programming learning encounters across all seven thinking processes. Instead of teachers limiting themselves to the development of only two or three thinking processes at the expense of neglecting others as they had done in the past, by mid-training they learned to develop all seven more adequately. Mean number of submitted ideas during the last two intervals of training do show significant increases across all seven thinking processes when training was concentrated on having teachers purposely generate and field-test new ideas for developing those thinking processes that had previously been neglected.

This finding further substantiates the previous statement that training programs for stimulating creative thinking in the classroom are complex requiring comprehensive process evaluation throughout training. Developing creative potential just does not happen in the classroom, but comes about by purposeful planning, careful preparation and a great deal of insight on the part of the teacher into modes of thinking among young children.

Evaluating Teaching Strategies

The second type of analysis of teacher generated and field-tested ideas was conducted across the twenty-three styles or strategies of teaching which comprise Dimension 2 of the model. Along with analyzing thinking processes as they were developed by innovative ideas in elementary school classrooms, we were equally concerned with strategies of teaching subject-matter content which teachers used to lead pupils to the development of thinking. As in the case of thinking processes, each submitted idea was likewise classified in accordance with one or several teaching strategies which teachers reported they had utilized in carrying out the idea in the classroom.

Table 2 presents a rank order of the five most prevalently employed teaching strategies used by teachers in their reported and field-tested ideas by grade level throughout three intervals of training. Table 3 analyzes the rank order of prevalently employed teaching strategies by grade levels for each interval of training. Tables 4, 5, and 6 present data on teaching strategies not employed or used infrequently (only once or twice) by teachers by grade levels throughout the three intervals of training.

It is interesting to note (See Table 3) that there were nine (9) separate, nonrecurring strategies out of the possible list of twenty-three

TABLE 2

RANK ORDER OF THE TOP FIVE TEACHING STRATEGIES MOST PREVALENTLY EMPLOYED BY PARTIALLY TRAINED TEACHERS ACROSS GRADE LEVELS THROUGHOUT THE THREE INTERVALS OF TRAINING

	K - 2	3 - 4	5 - 6
1966 September - December Submitted Ideas	1. # 14 Intuitive Expression 2. # 4 Thinking of Possibles # 23 Visualization Skill 3. # 18 Interact with Past Knowledge 4. # 2 Analogies # 19 Evaluate Situations 5. # 5 Provocative Questions	1. # 14 Intuitive Expression 2. # 4 Thinking of Possibles 3. # 10 Organized Random Search 4. # 19 Evaluate Situations 5. # 5 Provocative Questions # 12 Skills of Search # 18 Interact with Past Knowledge	1. # 4 Thinking of Possibles 2. # 19 Evaluate Situations 3. # 5 Provocative Questions # 10 Organized Random Search 4. # 14 Intuitive Expression 5. # 23 Visualization Skills
1967 January - March Submitted Ideas	1. # 14 Intuitive Expression 2. # 5 Provocative Questions 3. # 4 Thinking of Possibles # 10 Organized Random Search # 18 Interact with Past Knowledge 4. # 20 Receptive to Surprise 5. # 3 Sensing Deficiencies # 13 Tolerance for Ambiguity # 19 Evaluate Situations	1. # 4 Thinking of Possibles 2. # 10 Organized Random Search # 14 Intuitive Expression 3. # 19 Evaluate Situations 4. # 2 Analogies # 23 Visualization Skills 5. # 3 Sensing Deficiencies # 8 Reinforcing Originality # 9 Examples of Change # 18 Interact with Past Knowledge	1. # 18 Interact with Past Knowledge 2. # 4 Thinking of Possibles 3. # 3 Sensing Deficiencies 4. # 12 Skills of Search 5. # 5 Provocative Questions
1967 April - June Submitted Ideas	1. # 4 Thinking of Possibles 2. # 10 Organized Random Search # 14 Intuitive Expression 3. # 5 Provocative Questions 4. # 3 Sensing Deficiencies # 18 Interact with Past Knowledge 5. # 8 Reinforcing Originality	1. # 18 Interact with Past Knowledge 2. # 10 Organized Random Search 3. # 2 Analogies # 3 Sensing Deficiencies # 14 Intuitive Expression 4. # 12 Skills of Search # 19 Evaluate Situations 5. # 4 Thinking of Possibles	1. # 4 Thinking of Possibles 2. # 18 Interact with Past Knowledge 3. # 19 Evaluate Situations 4. # 10 Organized Random Search 5. # 3 Sensing Deficiencies

TABLE 3

Analysis Of Rank Order Of Top Five Most Prevalently Employed Teaching Strategies By Grade Level Throughout Three Intervals of Training

	September - December, 1966	January - March, 1967	April - June, 1967
Common Strategies Used Across All Grades	#4 Thinking of Possibles #5 Provocative Questions #14 Intuitive Expression #19 Evaluate Situations	# 3 Sensing Deficiencies # 4 Thinking of Possibles #18 Interact with Past Knowledge	# 3 Sensing Deficiencies # 4 Thinking of Possibles #10 Organized Random Search #18 Interact with Past Knowledge
Common Strategies Used In Primary and Middle Grades	# 4 Thinking of Possibles # 5 Provocative Questions #14 Intuitive Expression #18 Interact with Past Knowledge	# 3 Sensing Deficiencies # 4 Thinking of Possibles #10 Organized Random Search #14 Intuitive Expression #18 Interact with Past Knowledge #19 Evaluate Situations	# 3 Sensing Deficiencies # 4 Thinking of Possibles #10 Organized Random Search #14 Intuitive Expression #18 Interact with Past Knowledge
Common Strategies Used In Primary and Upper Grades	# 4 Thinking of Possibles # 5 Provocative Questions #14 Intuitive Expression #19 Evaluate Situations #23 Visualization Skills	# 3 Sensing Deficiencies # 4 Thinking of Possibles # 5 Provocative Questions #18 Interact with Past Knowledge	# 3 Sensing Deficiencies # 4 Thinking of Possibles #10 Organized Random Search #18 Interact with Past Knowledge
Common Strategies Used In Middle and Upper Grades	# 4 Thinking of Possibles # 5 Provocative Questions #10 Organized Random Search #19 Evaluate Situations	# 3 Sensing Deficiencies # 4 Thinking of Possibles #18 Interact with Past Knowledge	# 3 Sensing Deficiencies # 4 Thinking of Possibles #10 Organized Random Search #18 Interact with Past Knowledge #19 Evaluate Situations

TABLE 3 - Continued:

	September - December, 1966	January - March, 1967	April - June, 1967
Stragegies Used Only:			
In Primary Grades	#2 Analogies	#13 Tolerance for Ambiguity #20 Receptive to Surprise	# 5 Provocative Questions # 8 Reinforcing Originality
In Middle Grades	#12 Skills of Search	# 2 Analogies # 8 Reinforcing Originality # 9 Examples of Change #23 Visualization Skill	# 2 Analogies #12 Skills of Search
In Upper Grades	None	#12 Skills of Search	None
Total	9 Separate Strategies Most Prevalently Employed by Teachers During This Interval in Training	13 Separate Strategies Most Prevalently Employed by Teachers During This Interval in Training	10 Separate Strategies Most Prevalently Employed By Teachers During This Interval in Training
		4 New Strategies Used During This Interval Not Previously Reported	No New Strategies Used During This Interval Which were Not Previously Reported.

TABLE 4

LIST OF REPORTED TEACHING STRATEGIES NEVER EMPLOYED OR USED VERY INFREQUENTLY BY GRADE LEVELS THROUGHOUT THE INTERVAL OF TRAINING BETWEEN SEPTEMBER - DECEMBER, 1966

THOSE STRATEGIES EMPLOYED ONLY ONCE OR TWICE

K - 2	3 - 4	5 - 6
# 3 Sensing Deficiencies	# 6 Attribute Listing	# 1 Paradoxes
# 7 Exploring the Mystery of Things	# 16 Adjustment to Development	# 9 Examples of Change
# 13 Tolerance for Ambiguity	# 17 Study Creative People	# 12 Skills of Search
# 15 Process of Invention	# 20 Receptive to Surprise	# 13 Tolerance For Ambiguity
# 17 Study Creative People		# 15 Process of Invention
# 21 Creative Reading Skill		# 21 Creative Reading Skill
		# 22 Creative Listening Skill
6 Sub-total	4 Sub-total	7 Sub-total

THOSE STRATEGIES NEVER REPORTED AS BEING EMPLOYED

K - 2	3 - 4	5 - 6
# 1 Paradoxes	# 1 Paradoxes	None
# 9 Examples of Change	# 3 Sensing Deficiencies	
# 11 Examples of Habit	# 9 Examples of Change	
# 12 Skills of Search	# 11 Examples of Habit	
	# 15 Process of Invention	
4 Sub-total	5 Sub-total	0 Sub-total
10 Total	9 Total	7 Total

TABLE 5

LIST OF REPORTED TEACHING STRATEGIES NEVER EMPLOYED OR USED VERY INFREQUENTLY BY GRADE LEVELS THROUGHOUT THE INTERVAL OF TRAINING BETWEEN JANUARY - MARCH, 1967

THOSE STRATEGIES EMPLOYED ONLY ONCE OR TWICE

K - 2	3 - 4	5 - 6
# 1 Paradoxes	# 1 Paradoxes	None
# 6 Attribute Listing	# 7 Exploring Mystery of Things	
# 7 Exploring the Mystery of Things	# 11 Examples of Habit	
# 11 Examples of Habit	# 13 Tolerance for Ambiguity	
# 15 Process of Invention	# 17 Study Creative People	
5 Sub-total	5 Sub-total	0 Sub-total

THOSE STRATEGIES NEVER REPORTED AS BEING EMPLOYED

K - 2	3 - 4	5 - 6
# 17 Study Creative People	# 15 Process of Invention	# 17 Study Creative People
# 21 Creative Reading Skill	# 21 Creative Reading Skill	
2 Sub-total	2 Sub-total	1 Sub-total
7 Total	7 Total	1 Total

TABLE 6

LIST OF REPORTED TEACHING STRATEGIES NEVER EMPLOYED OR USED VERY INFREQUENTLY BY GRADE LEVELS THROUGHOUT THE INTERVAL OF TRAINING BETWEEN APRIL - JUNE, 1967

THOSE STRATEGIES EMPLOYED ONLY ONCE OR TWICE

K - 2	3 - 4	5 - 6
# 1 Paradoxes	# 1 Paradoxes	# 11 Examples of Habit
# 6 Attribute Listing	# 7 Exploring Mystery of Things	# 17 Study Creative People
# 11 Examples of Habit	# 9 Examples of Change	
# 15 Process of Invention	# 11 Examples of Habit	
# 19 Evaluate Situations	# 16 Adjustment to Development	
# 21 Creative Reading Skill	# 21 Creative Reading Skill	
6 Sub-total	6 Sub-total	2 Sub-total

THOSE STRATEGIES NEVER REPORTED AS BEING EMPLOYED

K - 2	3 - 4	5 - 6
# 17 Study Creative People	# 15 Process of Invention	None
	# 17 Study Creative People	
1 Sub-total	2 Sub-total	0 Sub-total
7 Total	8 Total	2 Total

on the model that were reported most prevalently used by teachers during the first interval of training (September - December, 1966). During the next interval of training (January - March, 1967) there were thirteen (13) separate, nonrecurring strategies reported used most prevalently by teachers with four (4) new strategies used that were not previously reported. However, during the last interval of training (April - June, 1967) no new strategies were reported in use but ten (10) formerly used strategies were repeatedly being used during that period of training. After the analysis of data which followed the first interval of training (September - December, 1966) there was a definite attempt made to sensitize teachers in the use of many different approaches for implanting knowledge in order to develop the pupils' thinking via the demonstration of those strategies which had not previously been reported in use. The goal of in-service training was to show teachers how to be flexible enough in their teaching patterns so as to employ and become comfortable with all twenty-three teaching strategies of the project model. Again, the premise was that the more and different ways the pupil is caused to think the better adapted the pupil will become to thinking. This endeavor certainly was apparent through the second interval of training (January - March, 1967) when comparison was made to the earlier interval of training, but this increase did not continue throughout the third interval of training (April - June, 1967). Even though the last interval of training (April - June, 1967) remained above the first interval of training (September - December, 1966) in respect to teaching strategies being used, optimum results did occur during the middle interval (January - March, 1967). This same finding resulted in the list of teaching strategies never employed or used only infrequently (see Tables 4, 5, and 6). There were fewer strategies appearing in Tables 5 and 6 than in Table 4 indicating teachers were learning how to accommodate some of the strategies later in training that had previously been reported as not used. Once again, data from Tables 4, 5, and 6 indicate that the optimum interval for training teachers to use as many of the twenty-three strategies of the model occurred between January and March, 1967 (Table 5), even though the number of strategies reported not in use during the last interval of training (Table 6) April - June, 1967, were still less than during the first interval of training (Table 4 - September - December, 1966). These data do support the hypothesis that teachers can increase and sustain their repertoire of teaching strategies by continued training.

Table 7 indicates ideas submitted by partially trained teachers by subject areas, grade levels and training intervals. This table presents a consistent finding with many other reported attempts in developing creative thinking in school classrooms by showing a prevalence of creative activities in the subject of the language arts. It is interesting to note that ideas for developing creative thinking processes in the areas of art and music are less prevalent here than in the social studies with science following in descending order. Arithmetic is the one subject area in which teachers least attempt to produce ideas for developing those productive-divergent thinking processes leading to creativity even though this subject lends itself just as readily to such thinking behaviors as any of the others in an elementary school curriculum. Again, in the dimension of subject-matter content as in the dimensions of thinking processes and teaching strategies, we were vitally concerned in sensitizing teachers with how to generate ideas

TABLE 7

ITEMIZED IDEAS BY SUBJECT-MATTER CONTENT BY GRADE LEVEL THROUGHOUT THREE INTERVALS OF TRAINING

Grade Level and Training Interval	Language Arts	Social Studies	Art-Music	Science	Arithmetic
Primary Grades (K-2)					
Sept. - Dec., 1966	30	11	16	10	1
Jan. - Mar., 1967	53	20	26	23	2
Apr. - June, 1967	35	8	17	11	3
Total	118	39	59	44	6
Middle Grades (3-4)					
Sept. - Dec., 1966	25	10	10	8	3
Jan. - Mar., 1967	43	24	16	13	4
Apr. - June, 1967	17	18	4	5	1
Total	85	52	30	26	8
Upper Grades (5-6)					
Sept. - Dec., 1966	25	13	6	9	6
Jan. - Mar., 1967	59	47	17	32	26
Apr. - June, 1967	26	27	13	6	6
Total	110	87	36	47	38
TOTALS	313	178	125	117	52

equally across all subjects of the entire curriculum rather than just to associate creative thinking with self expression through writing, art or music. We feel that creativity has too long remained in the periphery of the on-going school program. Instead, teachers should be shown how to develop those thinking processes which contribute to creative potential throughout all subjects of the school curriculum.

As can be seen in Table 7, ideas for developing productive-divergent thinking were much more prevalent in the language arts than in the other substantive fields. This finding is not consistent with responses made by project teachers when given the "Information Awareness Checklist" on the item asking them if they think science can be taught to develop creativity the same as writing. An analysis of responses to this item shows that most teachers (91%) answered "yes". Yet, ideas designed by these same teachers for developing creativity through science number almost three times fewer than those in language arts. Project teachers were still unable to develop creative thinking processes in some subjects as much as in other subjects of the curriculum. There is a need to have teachers concentrate further upon efforts to bring about creative thinking in the areas of social studies, science and arithmetic.

Figure 4 indicates the monthly submission rate of ideas classified acorss the project model throughout training. As can be seen by Figure 4 submission rates continued to increase. Three supplemental sets of those ideas generated and field-tested by project teachers during the months of February through June, 1967, were reproduced and sent out to each project teacher following the initial publication and dissemination of the IDEAS book in January. These supplemental sets were added to the CLASSROOM IDEAS FOR DEVELOPING PRODUCTIVE-DIVERGENT THINKING book which each project teacher had received. In this manner, each teacher was informed about what all of the other teachers had been doing which continued to build upon their repertoire of innovative and project classified ideas.

These data indicate that a consistent use of the full range of mental processes by pupils, including those that make up creativity, require much conscious effort, continued training, and many new teaching styles on the part of the teacher. Allowing opportunities for students to get involved in and committed to productive-divergent thinking requires teachers who are thoroughly trained in the use of a multitude of strategies for developing and guiding those processes as well as the many skills of thinking which contribute toward creative potential. The data presented in this chapter do verify that teachers can be upgraded in their competency to deal with creativity, but that this may be a much more complicated task than heretofore imagined requiring a very thoroughly planned and sustained in-service training program.

As was mentioned in the section entitled, Schedule of Individualized Training Programs At Each Project School Site, in Chapter 2, pages individual evaluation studies did occur under separate financial support at three of the six project schools in addition to the evaluative data presented herein. These studies and their findings are included in Appendix B of this report.

Monthly Submission Rate of Partially Trained Teacher's Generated And Field-Tested Ideas for Developing Productive-Divergent Thinking

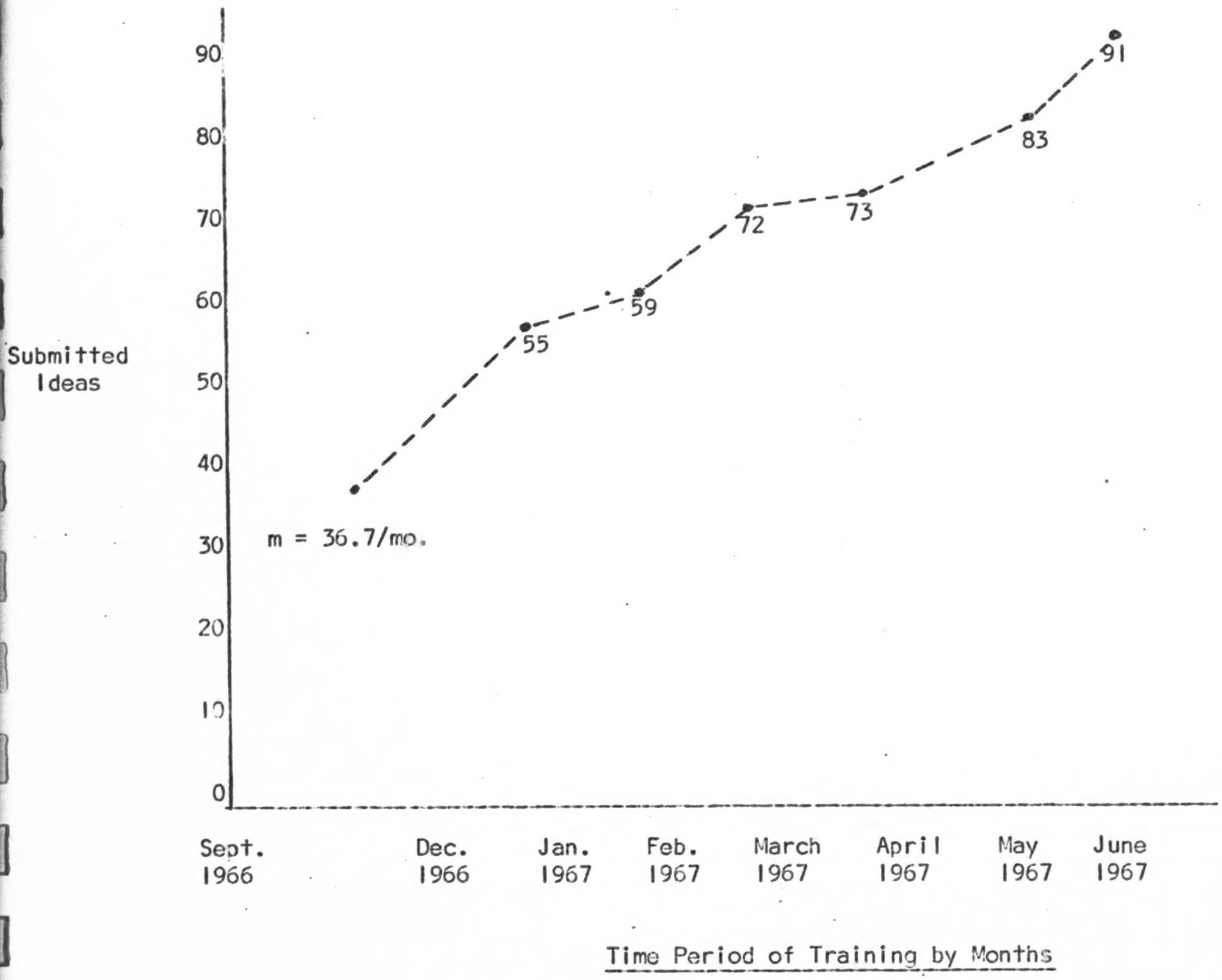


FIGURE 4

CHAPTER IV

SUMMARY AND IMPLICATIONS

The National Schools Project has consisted of a feasibility study of teacher in-service training based upon a theoretical model which has been under experimentation for use by partially trained teachers. The use of this project model with consequent training of teachers to implement it has been for the purpose of allowing teachers opportunities to generate and field-test their own innovative ideas for developing the pupil's productive-divergent thinking across an on-going elementary school curriculum using various teaching strategies. The project has included dissemination of these ideas to all project teachers in the form of a book which can be used by teachers as a supplement to their current classroom practices.

In addition to teacher developed, classified, field-tested ideas; in-service training has concentrated upon locating and classifying across the project model various media which teachers were shown how to use in developing productive-divergent thinking in elementary school classrooms. An annotated reference list of classified children's books and films by thinking process, teaching strategy, grade level, and subject area is included in this report.

The basic findings of the project have been in terms of evaluating teacher competency in generating and classifying their own innovative ideas and media for developing the productive-divergent thinking abilities of pupils. The purpose of the project has been that of establishing a model program for elementary school curriculum development in the area of creativity.

The evidence presented in this report supports the rationale that re-training programs in order to up-grade teachers' proficiencies in the area of creativity do strongly influence classroom teaching practices. Short term workshops sponsored by the project and continued in-service training were designed to broaden the base of teacher understandings concerning the wide range of children's thinking abilities which contribute to their creative potential. The training program assisted teachers in developing their own instructional idea units as well as locating and using media, all predicated upon the project's theoretical model, aimed specifically at the cultivation of productive-divergent thinking.

The procedures and findings reported herein are not replications of previous in-service programs held throughout the country in the area of creativity. Rather, they represent truly unique efforts as "educational innovations" for applying research findings, adapting these to regular classroom practices, field-testing new ideas and media, and dissemination. The combined evidence presented in this report definitely found that teachers did benefit from training. Results from the kind of evaluation conducted indicate that project teachers became sensitized to new materials, knowledge, and strategies for use in the classroom to systematically plan and develop creative thinking throughout the entire curriculum so that such learning processes will no longer be left to chance nor neglected.

Even though significant changes in classroom practices among some teachers did occur, one of the shortcomings of the project was the anticipation that the concept of applying all of the factors of each dimension of the project's theoretical model by all teachers could be achieved in the short term workshop approach by which the project was designed. This anticipation was not realized, and it became apparent that implementation of the model could not come about in a short period of time. It is questionable whether any teaching model requiring innovation and change on the part of the teacher can be expected to produce complete differences in classroom practices over a period of one year. We do believe, however, on the basis of the evidence collected during this pilot project, that if continuation training were employed and a longitudinal experiment were designed over a period of several years, measurable differences among all teachers might well be obtained.

As a result of this pilot project the following implications emerged:

1. The difficulty in getting all teachers to change strategies of teaching and be willing and flexible to innovate. Most teachers are well informed about stereotyped methods, scope and sequence, and subject-matter content; but few are adequately prepared in the more scholarly approaches of productive and divergent thinking, the involved concepts regarding a child's various intellectual abilities, and current research on conceptual levels of thinking among young children.

2. The necessity for a continued program of in-service training to be conducted by a carefully selected consultant for at least one more full school year at each project school.

3. From an evaluation of the effectiveness of in-service training of four project schools being trained earlier in the day as compared with two other project schools being trained after school (4:00-6:00 P.M.) with no release time; results indicate the extreme desirability of the staff of each project school to be given bi-monthly release time for in-service training. This can be arranged in different ways by substitute teachers and/or releasing children from school on two afternoons a month during the school year. Our results show that it is difficult to expect optimum effectiveness of in-service training for teachers after a full school day.

4. The necessity for at least two coordinating institutes or workshops conducted by the project director and attended by the consultant and the building principal of each project school. The purpose of these workshops would be for participants to discuss and interact together on the goals of the project, techniques by which these will be met, formulating a coordinated teacher in-service training program across all schools and districts of the project, and evaluating their effects.

5. The desirability to allow more exposure of this kind of teacher training to other principals and teachers who are ready and willing to innovate so as to obtain optimum transfer or "spread effect" to other elementary schools throughout the country.

6. The necessity to get this kind of training down earlier into pre-service programs at teacher preparatory institutions. One way of launching this as a minimum attempt is for present project schools to be utilized for on-site training of staff along with preparatory, practice teachers from local, nearby teacher training institutes.

Recommendations

It is recommended that the project be considered to shift emphasis from the pilot phase into an operational phase. Under this approach the following objectives should be undertaken:

1. To make available continuation in-service training programs for the staffs of existing project schools through the utilization of federal, state, and district funds.

2. To continue to train classroom teachers of existing project schools to master those teaching strategies of the project model to a degree that their own teaching programs will be completely modified and improved.

3. To make available to the project schools new instructional materials and innovative ideas carefully designed and tested as resources for the teaching of productive-divergent thinking.

4. To provide widespread coordination and dissemination activities by the Project Office for locating innovative ideas and materials which can be classified across the project model, conducting project institutes, selecting highly qualified consultants, and periodically visiting all project schools.

5. To invite leadership teams from other elementary schools within each project district to participate in the in-service training program with the staffs and consultant of each existing project school. Such leadership teams should consist of at least a building principal and a teacher from any other elementary school in the district.

6. To allow other elementary teachers and preparatory teachers within each project district to observe demonstration classes being conducted by selected trained teachers in existing project schools. In this manner trained project schools will become demonstration centers within each project district.

7. To adequately evaluate the extent that the first six objectives have been achieved by comprehensive measurement techniques of teachers as well as pupils.

PART II

ANNOTATED BIBLIOGRAPHY OF MEDIA CLASSIFIED ACROSS THE PROJECT'S THEORETICAL MODEL.

CHAPTER V

MEDIA DEVICES FOR TEACHING PRODUCTIVE-DIVERGENT THINKING

The following pages present annotated reference lists of children's books and films which teachers can use to develop productive-divergent thinking in elementary school classrooms. These media were carefully selected because their themes could be classified across the project's theoretical model in the same manner as teacher generated and field-tested idea units. Accordingly, these are indicated by grade level (for books only), thinking process(es), teaching strategy(ies) and subject area.

The first list includes a total of 93 books classified respectively for use by primary,middle and upper grade teachers. The second list is comprised of 47 films likewise classified by thinking process(es), teaching strategy(ies) and subject area but not by grade level.

It is intended that these lists be used by teachers for supplementing their current classroom practices by purposely programming input stimulus via media for fostering the child's creative potential. By referring to the classification of a particular book or film, the teacher is guided as to how that media device may be used and its purpose in developing productive-divergent thinking.

LIST I

CLASSIFIED BOOKS

8

To Develop: Originality - Flexibility Grade Level: K - 2
Through: Art
Using: Strategies
No. 8 - Reinforcing Originality
No. 23 - Visualization Skills

SNAIL, WHERE ARE YOU? - Tomi Ungerer
Harper & Bros., Inc.; New York City, New York.

Provocative illustrations of figures involving the spiral form of the snail in many different and original relationships could motivate an art class to add their own.

- - - - - -

To Develop: Originality Grade Level: K - 3
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 19 - Evaluating Situations

NAIL SOUP - Harve Zemach
Follett Publishing Company; Chicago, Illinois, 1964.

Original and inventive idea by a hungry tramp gets him a good hot meal.

- - - - - -

To Develop: Fluency - Flexibility Grade Level: K - 3
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 18 - Interact with Past Knowledge

ALL FALLING DOWN - Gene Zion
Harper & Bros., Inc.; New York City, New York.

Ideas and illustrations of different familiar kinds of falling down in a child's world.

- - - - - -

To Develop: Flexibility Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 14 - Intuitive Expression
No. 20 - Receptive to Surprise

CHICKEN SOUP WITH RICE - Maurice Semak
Harper & Row, Inc.; New York City, New York.

Rhymes and rhythms and twelve surprising imaginative places to find ordinary checken soup with rice and with illustrations that involve the reader.

- - - - - -

To Develop: Curiosity Grade Level: K - 3
Through: Language Arts
Science
Using: Strategies:
No. 18 - Interact with Past Knowledge
No. 23 - Visualization Skills

MOONBOY - Mike Thaler
Harper & Row, Inc.; New York City, New York, 1964.

MOONBOY is a whimsical little spirit who comes from his moon home at night to touch the earth with dreams and moonbeams. His perspective suggests new ways of looking at familiar things and places. Illustrations are provocative.

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To Develop: Fluency - Flexibility Grade Level: K - 2
Through: Science
Using: Strategies:
No. 10 - Organized Random Search

A TREE IS NICE - Janice May Udry
Harper & Bros., Inc.; New York City, New York.

Many different ways that a tree is nice creatively illustrated. Winner of the Caldecott Award in 1957.

To Develop: Willingness to Take Risks — Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 9 - Examples of Change
No. 16 - Adjustment to Development

ROLLING ROUND - Rolf Myller
Atheneum, Inc.; New York City, New York.

Fanciful story of how the wheel was invented through trial and error, necessity and accident.

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To Develop: Flexibility - Originality — Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 16 - Adjustment to Development
No. 18 - Interact with Past Knowledge

MAGNIFICENT PUMPKIN - Valdine Plasmati
Viking Press, New York City, New York, 1959.

This is an ordinary story of a family that has raised a great pumpkin and expected to take it to the fair and win a prize. When it was accidentally dropped and broken they had to be resourceful and find a new way to capitalize on it.

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To Develop: Curiosity — Grade Level: K - 2
Through: Science
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 12 - Skills of Search

GREG'S MICROSCOPE - Millicent Selsam
Harper & Row, Inc.; New York City, New York.

With his new microscope, Greg discovers the fascination of the world of tiny things and is introduced to satisfaction of independent scientific search and discovery.

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To Develop: Fluency - Originality Grade Level: K - 3
Through: Science
Art
Using: Strategies:
No. 2 - Analogies
No. 5 - Provocative Questions
No. 20 - Receptive to Surprise

ATTIC OF THE WIND - Doris Lund
Parent's Magazine Press, New York City, New York, 1966.

What will we find in the ATTIC OF THE WIND? Moving illustrations and shyming descriptions of many things that could blow away. The attic is a whimsical idea with implications for many imaginative speculations.

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To Develop: Flexibility - Fluency Grade Level: K - 3
Through: Art
Using: Strategies:
No. 14 - Intuitive Expression
No. 18 - Interact with Past Knowledge
No. 23 - Visualization Skills

GOING FOR A WALK WITH A LINE - Douglas & Elizabeth MacAgy
Doubleday and Company Inc.; Garden City, New York, 1959.

This "step into a world of modern art" is an exploration of the concept of line in terms of how the artist feels and thinks, presented in a way that could stimulate each one's unique perception of what he sees in the different kinds of examples of modern art.

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To Develop: Flexibility Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 8 - Reinforcing Originality
No. 11 - Examples of Habit
No. 17 - Study Creative People

LITTLE WOLF - Ann McGovern
Abelard Schuman; London, England and New York City.

Little Wolf had the courage to be different. Instead of becoming a great hunter like others boys in the tribe, he became a great healer and proved his unique value.

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To Develop: Originality - Willingness to Take Risks Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 4 - Thinking of Possibles
No. 9 - Examples of Change

I WISH THAT I HAD DUCK FEET - Theo Le Sieg
Random House, Inc.; New York City, New York, 1965.

This depicts the greatest childhood aventure of all -- wishing. A gay, fantastic story of what takes place in a child's mind -- preposterous wishes that couldn't possibly come true.

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To Develop: Originality Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 2 - Analogies

ON A SUMMER DAY - Lois Lenski
Henry Walck, Inc.; New York City, New York.

Brother and sister with many ideas for pretending at play, told in simple rhyme and illustrated with directness.

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To Develop: Originality Grade Level: K - 2
Through: Science
Art
Using: Strategies:
No. 8 - Reinforcing Originality

SWIMMY - Leo Lionni
Pantheon Press; New York City, New York.

Beautifully illustrated sea creatures are the background for this story of a little black fish who was different and had a most original idea that happily solved a little fish dilemma.

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To Develop: Flexibility - Preference for Complexity Grade Level: K - 2
Through: Arithmetic
Using: Strategies:
No. 2 - Analogies
No. 5 - Provocative Questions
No. 23 - Visualization Skills

BRIAN WILDSMITH'S 1, 2, 3's - Brian Wildsmith
Franklin Watts, Inc.; New York City, New York, 1965.

This book is an attempt to create in the child's mind deliberate and basic facts about numbers, shapes and forms. The book progresses through these basic shapes building up into recognizable forms to give the child an understanding, not only of the beauty and fascination of figures, but also making him aware that the world around us is built up around simple basic shapes.

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To Develop: Curiosity Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 6 - Attribute Listing

DADDIES WHAT THEY DO ALL DAY - Helen Walker Puner
Lothrop, Lee & Shepard Co, Inc.; New York City, New York, 1965.

The brief amusing text is full of action and information about what daddies do all day. Idea, text, and pictures are a sure fire combination for five-year olds.

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To Develop: Curiosity Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 6 - Attribute Listing
No. 12 - Skills of Search

WATCH OUT! - Norah Smaridge
Abingdon Press, New York City, New York, 1965.

Using signs as the vehicles for rules, the author presents basic rules and regulations in humorous, easy to read verse that instructs as it entertains.

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To Develop: Originality - Flexibility Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 2 - Analogies
No. 4 - Thinking of Possibles

THE RAIN PUDDLE - Adelaide Holl
Lothrop, Lee & Shepard Co., Inc.; New York City, New York, 1965.

This is a picture book enjoyed on several levels; from the second graders who will like the story's classic pattern and subtle appeal to a child's need to feel superior, down to the preschoolers who like to play with mirrors and who are just beginning to develop a concept of themselves.

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To Develop: Flexibility - Willingness to Take Risks Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 21 - Creative Reading Skills

JOSIE AND THE SNOW - Helen Buckley
Lothrop, Lee & Shepard Co., Inc.; New York City, New York, 1965.

This is a delightful text, with easy flow of the rhyme and brightly colored illustrations, along the theme of family fun in the snow.

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To Develop: Flexibility Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 2 - Analogies
No. 9 - Examples of Change

ZOO, WHERE ARE YOU? - Ann McGovern
Harper & Row; New York City, New York, 1964.

From a boy's strong desire to have a zoo nearby, comes the vivid imagination of transforming everyday objects into zoo characters. The similarity of the "beautiful junk" he collects to a zooful of animals is an interesting analogy.

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To Develop: Elaboration Grade Level: K -2
Through: Language Arts
Using: Strategies:
No. 16 - Adjustment to Development

JOHNNY MAPLELEAF - Alvin Tresselt
Lothrop, Lee & Shepard Co., Inc.; New York City, New York, 1948.

The cycle of the seasons told from the point of view of a little maple leaf, from the time it first breaks out of its tight brown bud in the spring until it finally falls to the ground for its winter.

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To Develop: Originality Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 9 - Examples of Change
No. 14 - Intuitive Expression

THE ANIMAL GARDEN - Ogden Nash
Evans & Company; New York City, New York, 1965.

This amusing story-poem gives an original solution to the children, Roy and Joy, who so wanted a pet and couldn't have any because of their parents' wheezes and sneezes.

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To Develop: Curiosity Grade Level: K - 2
Through: Art
Using: Strategies:
No. 4 - Thinking of Possibles
No. 23 - Visualization Skills

THE GOOD BIRD - Peter Wezel
Harper & Row, Inc.; New York City, New York, 1964.

By using visual skills one can think of the many probabilities which might lead to the title, THE GOOD BIRD.

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To Develop: Fluency - Curiosity
Through: Science
Music
Using: Strategies:
No. 2 - Analogies
No. 5 - Provocative Questions

Grade Level: K - 3

HORNS - Larry Kettelkamp
William Morrow and Company

Comparison of instrumental horns to natural horns of animals and a simple introduction to the production of sounds of many kinds of horns.

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To Develop: Curiosity
Through: Science
Art
Using: Strategies:
No. 14 - Intuitive Expression
No. 23 - Visualization Skills

Grade Level: K - 2

FULL OF WONDER - Ann Kirn
World Publishing Company; Cleveland, Ohio.

Texture, color and line of natural materials introduced in a personal response-provoking way. Stimulating ideas for making simple rubbings as real objects inspire sensitivity.

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To Develop: Curiosity
Through: Science
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 10 - Organized Random Search
No. 12 - Skills of Search

Grade Level: K - 2

THE WALK THE MOUSE GIRLS TOOK - Marie Kuskin
Harper & Row, Inc.; New York City, New York, 1967.

This book for young children combines a happy little story with a sample scientific identification of "discoveries" in the familiar world of nature by the mouse children.

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To Develop: Curiosity Grade Level: K - 3
Through: Science
Using: Strategies:
No. 2 - Analogies
No. 6 - Attribute Listing
No. 7 - Exploring the Mystery of Things

LIKE NOTHING AT ALL - Aileen Fisher
Thomas Y. Crowell Company; New York City, New York, 1962.

These are observations in charming poetry for children of nature's mysterious style of protective coloring in animals. There is a great sense of awareness of the world around us and a child's interpretation of his own application of nature's secret.

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To Develop: Fluency - Flexibility Grade Level: K - 3
Through: Music and Art
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 10 - Organized Random Search
No. 14 - Intuitive Expression

THE FIRST BOOK OF RHYTHMS - Langston Hughes
Franklin Watts, Inc.;

Many kinds of rhythms presented in a personalized and provocative way, including mysteries of rhythm in nature as well as in sound, sight, smell, time and space.

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To Develop: Flexibility Grade Level: K - 3
Through: Social Studies
Using: Strategies:
No. 9 - Examples of Change
No. 14 - intuitive Expression
No. 19 - Evaluating Situations

PETER'S CHAIR - Ezra Jack Keats
Harper & Row, Inc.; New York City, New York, 1967.

This sensitive story presents the familiar situation of the brother and his adjustment to the advent of the new baby in the home. Peter is a little negro boy. The illustrations are gentle as they are vivid.

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To Develop: Willingness to Take Risks Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 17 - Study Creative People

STORY OF JOHNNY APPLESEED - Aliki Brandenberg
Prentice Hall, Inc.; Englewood Cliffs, New Jersey.

Story of the unique contribution of John Chapman and the personal qualities that helped him achieve a place of gratitude in our history.

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To Develop: Fluency Grade Level: K - 2
Through: Science
Using: Strategies:
No. 4 - Thinking of Possibles
No. 10 - Organized Random Search
No. 16 - Adjustment to Development

WHERE ANY YOUNG CAT MIGHT BE - Carol Denison and Jack Cummin
Dodd Mead and Company; New York City, New York.

The ways of cats and the search for a lost kitten - many ideas for places to look, most of them wrong.

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To Develop: Elaboration Grade Level: K - 2
Through: Science
Using: Strategies:
No. 6 - Attribute Listing
No. 14 - Intuitive Expression

GILBERTO AND THE WIND - Marie Hall Ets
Viking Press; New York City, New York.

Simple description with highly intuitive illustrations of Gilberto and a child's feelings and sensitivities about the wind and the wind's caprices.

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To Develop: Flexibility - Curiosity Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 6 - Attribute Listing

HUMBUG WITCH - Lorna Balian
Abingdon Press; New York City, New York, 1965.

Whimsical little witch with all the traditional "trimmings" suddenly turns out to be just any little girl.

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To Develop: Originality Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 9 - Examples of Change

SOO LING FINDS A WAY - June Behrens
Golden Gate Junior Books; San Carlos, California.

Soo Ling helps her grandfather adjust to new kinds of launderies so his business can go on in spite of change.

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To Develop: Elaboration Grade Level: K - 2
Through: Language Arts - Social Studies
Using: Strategies:
No. 2 - Analogies
No. 7 - Exploring the Mystery of Things
No. 14 - Intuitive Expressions

THE SUN IS A GOLDEN EARRING - Natalia Belting
Holt, Rinehart and Winston; New York City, New York.

A collection of folk sayings of the world with analogies of primitive people to explain the mysteries of earth and sky, sensitively illustrated, and with an invitation to the reader to dream as they dreamed, and ponder and match their thoughts to your own.

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To Develop: Flexibility - Originality Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 5 - Provocative Questions
No. 21 - Creative Reading Skills

WHAT CAN YOU DO WITH A POCKET? - Eve Merriam
Alfred A. Knopt, New York City, New York, 1964.

"A pocket is like the nighttime with the covers all snug and tucked in and stars shining bright above. A pocket can be your dream. What do you want to put in it?" This is the summary idea of this gay collection of ideas for what you can do with a pocket.

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To Develop: Flexibility - Curiosity Grade Level: K - 3
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 12 - Skills of Search
No. 14 - Intuitive Expression

ADVENTURES WITH A BALL - Harry Milgrom
E. P.Dutton & Company, Inc.; New York City, New York.

Introduction to discovery and experimentation is presented in a provocative way. Children are led to observe carefully, to reason clearly and to act imaginatively through simple experiments with a ball.

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To Develop: Flexibility - Curiosity Grade Level: K - 3
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 12 - Skills of Search
No, 14 - Intuitive Expression

ADVENTURES WITH A STRING - Harry Milgrom
E. P. Dutton &Company, Inc.; New York City, New York.

Introduction to discovery and experimentation is presented in a provocative way. Children are led to observe carefully, to reason clearly and to act imaginatively through simples experiments with a piece of string.

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To Develop: Fluency - Curiosity Grade Level: K - 2
Through: Science
Art
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 6 - Attribute Listing
No. 19 - Evaluate Situations

MR. WONDERFUL - Barbara Kidder
T. S. Denison & Co., Inc; Minneapolis, Minnesota, 1966.

This book has captured in imaginative style and illustrated our bodies - referred to as "Mr. Wonderful". This book will help the reader to develop good health habits.

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To Develop: Preference for Complexity Grade Level: K - 2
Through: Language Arts
Using: Strategies:
No. 16 - Adjustment to Development
No. 18 - Interact with Past Knowledge

THE KING, THE MICE AND THE CHEESE - Nancy and Eric Gurney
Random House, Inc.; New YorkCity, New York, 1965.

A fantastic, funny fable for beginners, this book is about a king who needed cats to get rid of the mice who were after his best cheese. One solution leads to another problem which becomes complex but hilarious.

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To Develop: Curiosity - Elaboration Grade Level: K - 2
Through: Social Studies
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 18 - Interact with Past Knowledge

ANIMALS DO THE STRANGEST THINGS - Leonora and Arthur Hornblow
Random House, Inc.; New York City, New York, 1964.

"Facts can be as entertaining as fiction" which is proven in this book of knowledge and illustrations -- astonishing and little known facts about some very well known animals are disclosed.

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To Develop: Originality Grade Level: K - 3
Through: Language Arts
Art
Using: Strategies:
No. 4 - Thinking of Possibles
No. 7 - Exploring the Mystery of Things
No. 23 - Visualization Skills

ALEXANDER AND THE CAR WITH A MISSING HEADLIGHT - Peter Fleischmann
Viking Press; New York City, New York, 1967.

Bursting with color and the spontaneity that children bring to painting, Alexander's exuberant adventures with his little old car, a ferocious dog, a woodpecker, a baby elephant, and an African princess makes joyous reading for young children and a brilliant picture book for all ages.

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To Develop: Originality - Fluency Grade Level: K - 3
Through: Language Arts
Art
Using: Strategies:
No. 5 - Provocative Questions
No. 13 - Tolerance for Ambiguity
No. 20 - Receptive to Surprise

THE BIRTHDAY PRESENT - Bruno Munari
World Publishing Company; New York City, New York, 1959.

A picture book of great originality and charm. Very young children will find endless amusement in the simple, brightly colored pictures.

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To Develop: Flexibility Grade Level: K - 3
Through: Social Studies
Language Arts
Using: Strategies:
No. 4 - Thinking of Possibles
No. 9 - Examples of Change
No. 16 - Adjustment to Development

THE ELEPHANT'S WISH - Bruno Munari
World Publishing Company; New York City, New York, 1959.

The elephant wishes to be a bird, the bird wishes to be a fish, the fish wishes, etc. Simple, beautifully composed and richly colored illustrations.

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To Develop: Originality - Fluency Grade Level: K - 3
Through: Language Arts
Art
Using: Strategies:
No. 4 - Thinking of Possibles
No. 5 - Provocative Questions
No.20 - Receptive to Surprise

WHO'S THERE? OPEN THE DOOR - Bruno Munari
World Publishing Company; New York City, New York - 1957.

Easily the most impressively original works of Munari, great in design and imagination.

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To Develop: Originality - Curiosity Grade Level: K - 3
Through: Language Arts
Art
Using: Strategies:
No. 6 - Attribute Listing
No. 14 - Intuitive Expression

THE SNOWY DAY - Ezra Keats
The Viking Press; New York City, New York, 1966.

The quiet fun of this small boy's adventures in the deep snow have the true quality of all childhood's delight in contented solitude. Beautifully spacious pictures. Winner of the Caldecott Medalin 1966.

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To Develop: Originality - Flexibility Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 8 - Reinforcing Originality
No. 18 - Interact with Past Knowledge

ANIMALS ON THE CEILING - Richard Armour
McGraw-Hill Book Company; New York City, New York, 1966.

In relaxed rhymed couplets a boy tells how after stormy nights, when the rain soaks through a leady roof, he and his sister find an intriguing collection of creatures on the ceiling. The children gaze with delight at the overhead menagerie - sodden shapes in brownish wash that suddenly and uncannily come alive in the mind of the child.

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To Develop: Elaboration Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 10 - Organized Random Search
No. 21 - Creative Reading Skills

PLEASE SHARE THAT PEANUT! - Sesyle Joslin and Simms Taback
Harcourt Brace & World, Inc.; New York City, New York, 1965.

This is a preposterous pageant in fourteen acts which clearly establishes the saying "mine" is not nearly so much fun as saying "ours".

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To Develop: Originality - Willingness to Take Risks Grade Level: 3 - 4
Through: Art
Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 17 - Study of Creative People

SARAH AND SIMON AND NO RED PAINT - Edward Ardizzone
Delacorte Press; New York City, New York, 1965.

Realistically told story of two children of a patient and courageous artist whose ideas and action are instrumental in their father's financial success as a painter.

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To Develop: Originality - Flexibility GradeLevel: 3 - 4
Through: Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 8 - Reinforcing Originality
No. 16 - Adjustment to Development

THE FLYING PATCHWORK QUILT - Barbara Brenner
Young Scott Books, New York City, New York.

Ellen tries many different ways of trying to fly. Her brother tells how she found a way to fly off with an old patchwork quilt.

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To Develop: Originality Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 19 - Evaluate Situations

FLAT STANLEY - Jeff Brown
Harper & Row, Inc.; New York City, New York, 1964.

Stanley becomes two-dimensional and until his brother has an inspiration and returns him to normal, Stanley experiences many interesting consequences of his unusual form.

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To Develop: Originality - Curiosity Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 4 - Thinking of Possibles
No. 19 - Evaluate Situations

ST. NICHOLAS AND THE TUB - Brian Burland
Holiday House; New York City, New York, 1964.

Why do the earliest pictures of St. Nicholas show him standing in a tub with three children? What are they doing there? No one really knows. Here is an opportunity for children to hypothesize and speculate as well as to enjoy one imaginative, artistically illustrated legend.

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To Develop: Elaboration - Curiosity Grade Level: 3 - 4
Through: Social Studies
Language Arts
Using: Strategies:
No. 10 - Organized Random Search
No. 22 - Creative Listening Skills

CAPTAIN BOLDHEART AND THE MAGIC FISHBONE - Charles Dickens
MacMillan Company; New York City, New York.

Two classic Victorian children's stories from Dickens which could furnish the beginning of considerable investigation of the history of pirate days and exploration of the high seas and life in Victorian England. One story of particular appeal to boys, the other to girls.

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To Develop: Willingness to Take Risks Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 13 - Tolerance for Ambiguity
No. 19 - Evaluate Situations

FLY AWAY GOOSE - Fen H. Lasell
Houghton, Mifflin Company; Boston, Massachusetts, 1965.

Here are the thoughts of an imaginative child who knows well the realities of the world. Writings and drawings are sensitive and poetic in this story of a child who faces a decision in a personal and profound way. Should she gather the egg as she is told or let the mother goose hatch it and accept the consequences which are certain to follow?

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To Develop: Curiosity - Willingness to Take Risks Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 7 - Exploring the Mystery of Things
No. 13 - Tolerance for Ambiguity

FAMOUS MYSTERIES OF THE SEA - Patricia Lauber
Thomas Nelson & Sons; New York City, New York.

Authentic accounts of mysterious disappearances of nine ships and a plane. Concise facts are given and hypotheses discussed. Conclusions are open-ended.

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To Develop: Curiosity - Willingness to Take Risks Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 21 - Creative Reading Skills

MISS TIBBETT'S TYPEWRITER - Eve Merriam
Alfred A. Knopf; New York City, New York.

This book offers the chance to read signs and messages from an old typewriter with troubles on the keyboard. Missing letters allow speculation and testing of perception.

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To Develop: Fluency - Originality Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 9 - Examples of Change
No. 16 - Adjustment to Development

HENRY, THE UNCATCHABLE MOUSE - Sidney Simon
W. W. Norton & Co.; New York City, New York, 1964.

How many ways did Henry the mouse invent for eating the cheese out of the trap without being caught? The list is long, the methods are clever and impromptu and the rewards for creative thinking are great.

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To Develop: Flexibility Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 13 - Tolerance for Ambiguity

ONCE THERE WAS AND WAS NOT - Virginia Tashjian
Little Brown & Company.

Collection of Armenian folktales of ordinary people who are sometimes the victims of trickery and enchantment. Their peculiar resolutions of real problems blended with fancy provoke paradoxical thinking.

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To Develop: Curiosity - Willingness to Take Risks Grade Level: 3 - 4
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 9 - Examples of Change
No. 12 - Skills of Search

ANIMAL TIMEKEEPERS - Navin Sullivan
Prentice-Hall, Inc.; New York City, New York, 1966.

Features the strange inner-timing mechanisms inherent in all life. One section features the various changes and patterns of the day-night rhythm, the season changes and patterns of the tide. Will arouse the curiosity of the children.

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To Develop: Originality - Flexibility   Grade Level: 3 - 4
Through: Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 8 - Reinforcing Originality
No. 18 - Interact with Past Knowledge

ANIMALS ON THE CEILING - Richard Armour
McGraw-Hill Book Company; McGraw-Hill Book Company,

To Develop: Curiosity - Originality Grade Level: 2 - 6
Through: Language Arts
Using: Strategies:
No. 4 - Thinking of Possibles
No. 18 - Interact with Past Knowledge
No. 22 - Creative Listening Skills

1001 RIDDLES - George Carlson
Platt and Munk; New York City, New York, 1959.

In this collection are riddles on almost every subject. Care has been taken to select riddles of particular interest to children. This book will delight children of all ages and would be great to use on a rainy day in the classroom.

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To Develop: Curiosity - Willingness to Take Risks Grade Level: 5 - 6
Through: Social Studies
Art
Using: Strategies:
No. 15 - Process of Invention
No. 17 - Study of Creative People

LEONARDO DA VINCI - Jay Williams
American Heritage Publishers, Inc.; 1965.

A condensed study of the life and works of a famous man. One learns that it is not only the masterpieces of art and inventions to be admired, but his mind and spirit to be remembered.

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To Develop: Curiosity Grade Level: 5 - 6
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 7 - Exploring the Mystery of Things
No. 15 - Process of Invention

TELL ME WHY - Arkady Leokum
Grosset and Dunlap; New York City, New York, 1965.

Provocative questions bring about a strong curiosity to find the solution to scientific problems that are relatively simple for children to understand.

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To Develop: Curiosity Grade Level: 5 - 6
Through: Social Studies
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 10 - Organized Random Search
No. 12 - Skills of Search

THE ADVENTURE OF AMERICA - John Tobias and Savin Hoffecker
Random House, Inc.; New York City, New York, 1962.

This is a saga of America through the powerful force of strong poetry, eye-witness accounts of historical events, journal entries, letters, inspirational speeches to a total of more than 200 selections arranged chronologically from our land's beginning to the John Kennedy inaugural. History becomes more personal when seen through personal writings.

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To Develop: Curiosity - Originality Grade Level: 5 - 6
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 15 - Process of Invention

SOMEDAY YOU'LL WRITE - Elizabeth Yates
E. P. Dutton & Co., Inc.; New York City, New York, 1962.

Young people who have a desire to write can be guided and encouraged by this practical but sensitive book that was written in answer to a real request by a real eleven-year old who really wanted to know how to become a writer.

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To Develop: Flexibility - Curiosity Grade Level: 4 - 6
Through: Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 7 - Exploring the Mystery of Things
No. 20 - Receptive to Surprise

DESMOND AND THE PEPPERMINT GHOST - Herbert Best
Viking Press; New York City, New York, 1966.

Desmond has a very special talent of being a detective. A canine protest against being a sled dog turns into something quite different and right up Desmond's alley. Desmond and Gus, his master, find themselves faced with a most mystifying experience involving a peppermint scent, a haunted house and a ghost.

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To Develop: Elaboration Grade Level: 4 - 6
Through: Music and Art
Using: Strategies:
No. 14 - Intuitive Expression
No. 18 - Interact with Past Knowledge

HOW ART AND MUSIC SPEAK TO US - Cornelia Spencer
John Day Company; New York City, New York.

The universal language of art and music is brought into focus. Expressions of deepest feelings and clearest imaginings can be confronted, discussed and responded to.

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To Develop: Flexibility - Curiosity Grade Level: 4 - 6
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 10 - Organized Random Search
No. 12 - Skills of Search

THE CHEMISTRY OF A LEMON - Harris A. Stone
Prentice Hall, Inc.; New York City, New York, 1966.

Many different ways of exploring the chemistry of a lemon through simple experiments and suggestive leading questions. Observation leads to scientific knowledge and understanding of resulting vocabulary.

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To Develop: Curiosity Grade Level: 2 - 6
Through: Language Arts
Using: Strategies:
No. 2 - Analogies
No. 6 - Attribute Listing
No. 7 - Exploring the Mystery of Things

THE THINGS THAT ARE - Adrian Stoutenburg
Reilley & Lee, Inc.; Chicago, Illinois, 1964.

These poems have a directness and perception that would stimulate any child to think more deeply about commonplace things and personal feelings. They are illustrated in terms of young children but their style has enough sophistication to make them appealing to upper grades.

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To Develop: Flexibility
Through: Language Arts
Using: Strategies:
No. 13 - Tolerance for Ambiguity
No. 20 - Receptive to Surprise
No. 21 - Creative Reading Skills

Grade Level: 4 - 6

PUN FUN - Ennis Pees
Alebard Schuman, 1965.

Puns ,like riddles can be symbolic of the unknown and literature, including Shakespeare and Homer makes use of them. Some modern writing seems to suggest the return of the pun and all forms of verbal ambiguity.

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To Develop: Curiosity - Willingness to Take Risks
Through: Science
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 15 - Process of Invention
No. 17 - Study of Creative People

Grade Level: 4 - 6

MEN AND DISCOVERY - Milton A. Rothman
W. W. Norton & Company; New York City, New York.

Man's natural curiosity, his search for knowledge, the excitement of accidental discovery, qualities and climate compatible with research, and many other vital ideas combine with biographical history of significant scientists.

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To Develop: Curiosity
Through: Science
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 12 - Skills of Search
No. 17 - Study of Creative People

Grade Level: 5 - 6

A SENSE OF WONDER - Dorothy Shuttlesworth
Doubleday and Company, Inc.; New York City, New York.

A collection of nature writings from nineteen of the world's best writers in that field. Richard Byrd, Rache Carson, Marco Polo, etc. are included. This kind of writing of the world of nature and science opens the eyes of other people to these wonders.

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To Develop: Curiosity - Willingness to Take Risks Grade Level: 5 - 6
Through: Social Studies
Science
Using: Strategies:
No. 8 - Reinforcing Originality
No. 12 - Skills of Search
No. 17 - Study of Creative People

CARRY ON, MR. BOWDITCH - Jean Latham
Houghton, Mifflin Company; Boston, Massachusetts.

True story of boy from Salem in days of sailing ships, too small to be a good sailor but quick at figures, who learned navigation skills by search and study and developed new techniques still used today.

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To Develop: Originality - Curiosity Grade Level: K - 6
Through: Language Arts
Art
Using: Strategies;
No. 2 - Analogies
No. 6 - Attribute Listing
No. 14 - Intuitive Expression

HAILSTONES AND HALIBUT BONES - Mary O'Neill
Doubleday and Company; Garden City, New York, 1961.

Twelve colors interpreted with a compelling sense of rhythm and imagery. The colors can be heard and touched, smelled as well as seen as each dimension of color is discovered and transformed by the special magic of the imagination. Illustrations are stimulating.

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To Develop: Fluency - Originality Grade Level: 3 - 6
Through: Science
Language Arts
Using: Strategies:
No. 2 - Analogies
No. 14 - Intuitive Expression
No. 22 - Creative Listening Skills

WHAT IS THAT SOUND? - Mary O'Neill
Antheneum Press, New York City, New York, 1966.

Descriptive words and analogies stimulate feelings about sound and encourage personal and intuitive responses to the picturesque expressions of what life and living are all about.

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To Develop: Originality Grade Level: 4 - 6
Through: Social Studies
Using: Strategies:
No. 8 - Reinforcing Originality
No. 10 - Organized Random Search

CLOWNS THROUGH THE AGES - John Hornby
Henry Z. Walck, Inc., 1962.

This is an account of the history of the professional laugh-maker, from the earliest beginning thousands of years ago in Egypt to the most modern. Respect for the creative art of clowning finds expression in many distinctive backgrounds of history with considerable information being offered.

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To Develop: Originality Grade Level: 4 - 6
Through: Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 8 - Reinforcing Originality
No. 19 - Evaluate Situations

TYLL WENSPIEGEL'S MERRY PRANKS - M. A. Jagendorf
Vanguard Press; New York City, New York, 1938.

These legends had their origin in Flanders and Germany. This collection catches their roguish flavor as well as their wisdom. They are the stories of Tyll's life as a jester and of how he was always telling people the truth through jests and pranks.

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To Develop: Willingness to Take Risks Grade Level: K - 6
Through: Language Arts
Using; Strategies:
No. 20 - Receptive to Surprise
No. 21 - Creative Reading Skills
No. 22 - Creative Listening Skills

MORE JOKES FOR CHILDREN - Marguerite Kohl and Frederica Young
Hill and Wang; New York City, New York, 1966.

Jokes, riddles and daffy definitions sometimes with obscure definitions but specifically for children can give young readers opportunities to guess and take chances.

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To Develop: Willingness to Take Risks Grade Level: 5 - 6
Through: Social Studies
Language Arts
Using: Strategies:
No. 9 - Examples of Change
No. 19 - Evaluate Situations

HAKON OF ROGEN'S SAGA - Erik Haugaard
Houghton, Mifflin Company; Boston, Massachusetts, 1963.

This powerfully written story of a young Viking boy offers many opportunities for discussion and speculation. It is a realistic account of a harsh but heroic people and the courage and struggle of the hero to survive.

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To Develop: Curiosity Grade Level: 5 - 6
Through: Science
Social Studies
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 4 - Thinking of Possibles
No. 7 - Exploring the Mystery of Things

KON-TIKI - Thor Heyerdahl
Rand, McNally Company; New York City, New York, 1960.

The 101-day voyage of an authentically primitive type of raft was undertaken as a scientific test of a long studied and researched theory. This is a special color edition for young people with over 120 illustrations. It is high adventure and it is real.

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To Develop: Willingness to Take Risks Grade Level: 4 - 6
Through: Language Arts
Using: Strategies:
No. 16 - Adjustment to Development
No. 21 - Creative Reading Skills
No. 22 - Creative Listening Skills

SERENDIPITY TALES - Elizabeth Jamison Hodges
Atheneum Press; New York City, New York, 1966.

"The gift for finding valuable or agreeable things not sought for" is the description here for serendipity and is the theme that distinguishes the seven mysterious tales from Persia, India and Ceylon.

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To Develop: Elaboration — Grade Level: 5 - 6
Through: Language Arts
Using: Strategies:
No. 2 - Analogies
No. 6 - Attribute Listing

IN THE WOODS - IN THE MEADOW - IN THE SKY - Aileen Fisher
Charles Scribner & Sons; New York City, New York.

Poems of familiar things and fanciful personification of nature with perception and intensity and delightful illustrations.

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To Develop: Curiosity - Willingness to Take Risks — Grade Level: 5 - 6
Through: Science
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 7 - Exploring the Mystery of Things
No. 12 - Skills of Search

DR. WILLIAM HARVEY - William C. Harrison
MacMillan Company; New York City, New York.

Somewhat sophisticated and scientifically slanted biography of a boy whose curiosity and tireless observation and experiments gave the world one of the most important medical discoveries of all time - the discovery of circulation.

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To Develop: Willingness to Take Risks — Grade Level: 5 - 6
Through: Social Studies
Language Arts
Using: Strategies:
No. 9 - Examples of Change
No. 13 - Tolerance for Ambiguity
No. 19 - Evaluate Situations

A SLAVE'S TALE - Erik Haugaard
Houghton, Mifflin Company; Boston, Massachusetts, 1965.

This story is a sequel to HAKON OF ROGEN'S SAGA and tells a story of high adventure in Viking times from the point of view of a slave girl. There is tragedy and tenderness in its insight into a world where various kinds of slavery can still exist. The story offers stimulating ideas for serious thinking.

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To Develop: Curiosity Grade Level: 4 - 6
Through: Science
Using: Strategies:
No. 15 - Process of Invention
No. 16 - Adjustment to Development
No. 17 - Study of Creative People

THOMAS ALVA EDISON - Margaret Cousins
Random House, Inc.; New York City, New York, 1965.

Documented story of the personal life and accomplishments of Edison with photographs that realistically enhance the reader's appreciation of this individual who literally changed the world and of his human qualities.

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To Develop: Elaboration - Curiosity Grade Level: 4 - 6
Through: Social Studies
Using: Strategies:
No. 5 - Provocative Questions
No. 10 - Organized Random Search

LIFE IN LINCOLN'S AMERICA - Helen Reeder Cross
Random House, Inc.; New York City, New York, 1964.

Old diaries, letters and eye witness accounts of life in America during the time of 1800-1865 form the authentic background for the account of these exciting times. Illustrations include many old prints. Entire flavor of the book is real and could trigger many questions for further investigation.

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To Develop: Originality Grade Level: 4 - 6
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 15 - Process of Invention

THE BRAINSTORMERS - Bick, Carlson, Dale
Doubleday and Company, Inc.; New York City, New York, 1966.

Collection of stories of plots, pranks, bright ideas and monkeyshines, ingenious inventions and financial high jinks that are a tribute to the ingenuity of the American bon.

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To Develop: Preference for Complexity   Grade Level: 4 - 6
Through: Science
Using: Strategies:
No. 15 - Process of Invention
No. 17 - Study of Creative People

FIVE SONS OF ITALY - Helen Acker
Thomas Nelson & Sons, 1965.

This book contains biographies of five great men of the Renaissance: DaVinci, Michelangelo, Galileo, Raginini and Verdi. It discusses those factors which contributed to their productivity and presents a vivid account of their difficulties and trouble as highly creative individuals.

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To Develop: Curiosity   Grade Level: 4 - 6
Through: Science
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 12 - Skills of Search
No. 19 - Evaluate Situations

RESEARCH IDEAS FOR YOUNG SCIENTISTS - George Barr
McGraw-Hill Company; New York City, New York, 1958.

Application of scientific methods in exploring and discovering answers to questions about the immediate surroundings of children. A great many stimulating ideas for direct observation and search with guidance from this New York educator and writer.

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To Develop: Flexibility   Grade Level: 4 - 6
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 11 - Examples of Habit
No. 13 - Tolerance for Ambiguity

THE KING WHO SAVED HIMSELF FROM BEING SAVED - John Ciardi
J. B. Lippencott, New York City, New York, 1965.

A delightful poem in support of new points of view. It is a familiar fairy tale with a non-conventional, real, honest, refreshing cast.

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To Develop: Curiosity Grade Level: 4 - 6
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 7 - Exploring the Mystery of Things

BATHTUB PHYSICS - Hy Ruchlis
Brace Harcourt; New York City, New York, 1967.

Have you ever thought of your bathtub as a scientific tub? Using it as a basis for experimentation and the book for reference, you can learn about waterwaves, sound waves, light beams, magnetism and weight of water. Brain teasers at the end of each chapter pose questions that observant experimenters will be able to answer.

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To Develop: Curiosity Grade Level: 4 - 6
Through: Social Studies
Using: Strategies:
No. 2 - Analogies
No. 20 - Receptive to Surprise

I SAW A ROCKET WALK A MILE - Carl Withers
Holt, Rinehart Company; New York City, New York, 1965.

The art of story telling at its amusing best. From an old lady who swallowed a fly to a johnny-cake outwitted by a wily fox, the ageless appeal of the absurd is delightfully affirmed in this entertaining book.

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To Develop: Flexibility - Fluency Grade Level: 2 - 6
Through: Language Arts
Using: Strategies:
No. 6 - Attribute Listing
No. 13 - Tolerance for Ambiguity

THE VERY NICE THINGS - Jean Merrill
Harper & Brothers; New YORK City, New York; 1959.

While walking in the woods one day, William Elephant found some very nice things but his friend, Old Owl, was certain they were useless. However, William Elephant did find some very interesting uses for them. Children will love this story with its entrancing pictures.

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LIST II

CLASSIFIED FILMS

To Develop: Originality - Elaboration
Through: Art - Music
Using: Strategies:
No. 4 - Thinking of Possibles
No. 8 - Reinforcing Originality

FIDDLE DE DEE 4 min. - Color

Amusing color patterns and artistic imagination to the music of "listen to a Mocking Bird" performed by a fiddle and string orchestra. An example of how Norman McLaren paints directly on films.

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To Develop: Curiosity - Elaboration
Through: Science
Language Arts
Using: Strategies:
No. 5 - Provocative Questions
No. 7 - Exploring the Mystery of Things
No. 16 - Adjustment to Development

THE FISH THAT TURNED GOLD 16 min. - Color

Presents the story of a goldfish from spawning until the goldfish is sold to a child. Introduces the main character, Goldey, developing inside a goldfish egg and follows through his growth. Shows the goldfish's appearance, size, natural habitat, food and adjustment to a home aquarium environment. Provides story-telling material through a dream sequence.

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To Develop: Flexibility - Originality
Through: Language Arts
Using: Strategies:
No. 19 - Evaluate Situations
No. 22 - Creative Listening Skills
No. 23 - Creative Visualization Skills

HUNTER AND THE FOREST 9 min. - b/w
Encyclopaedia Britannica Films, Inc.

In this highly sensitive, imaginative film, there is no narration - only the sounds of the woods, full of birds and wild animals. The hunter finds such beauty there that he is unable to kill any of the wildlife.

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To Develop: Fluency - Flexibility
Through: Social Studies
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 11 - Examples of Habit
No. 16 - Adjustment to Development

SQUEAK THE SQUIRREL 11 min. - Color
Churchill Films
Los Angeles, California

This film shows how a squirrel has learned to solve problems connected with getting his food. Squeak if first seen in an outdoor setting as he gets food and looks in a mirror; then he is pictured as he responds to more and more difficult food-getting situations in a laboratory.

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To Develop: Fluency - Flexibility
Through: Music - Art
Using: Strategies:
No. 4 - Thinking of Possibles
No. 14 - Intuitive Expression
No. 23 - Visualization Skills

SHORT AND SUITE 5 min. - Color
National Film Board of Canada
New York City, New York

Experimental film using photographic imagery to interpret the lively jazz of E. Rathburn in perfect synthesis of sound and vision.

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To Develop: Originality - Elaboration
Through: Language Arts
Using: Strategies:
No. 2 - Analogies
No. 19 - Evaluate Situations

MAGNOLIA 7 min. - b/w

Brief dramatic episode in pantomine form at an abandoned mine. Through one pathetic flower growing nearby, Magnolia (a being who inhabits the old mine) makes contact with Suzie (a little girl who represents human life in the outside world). An original music score sensitively parallels the pictorial story.

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To Develop: Originality - Flexibility
Through: Language Arts
Using: Strategies:
No. 8 - Reinforcing Originality
No. 10 - Organized Random Search
No. 15 - Process of Invention

THE STORY OF A BOOK 11 min. - Color
Churchill Films
662 No. Robertson Blvd.
Los Angeles, California

The film follows the author H. C. Holling through the creation of Pagoo, the story of a hermit crab, from the first idea to final preparations for printing. This opens a doorway on the intriguing behind the scenes creation of a book and shows the enthusiasm of its author. This film helps children to a new enjoyment and appreciation of books.

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To Develop: Elaboration - Originality
Through: Art
Language Arts
Using: Strategies:
No. 1 - Paradoxes
No. 23 - Visualization Skills

ONCE UPON A HILL 11 min. - Color
McGraw Hill Book Company
Audio-Visual Division
New York City, New York

Unique dramatization of an Old Testament story telling of two friends so close in thought and actions that the king takes an example from them. Dramatic presentation done in silhouette form.

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To Develop: Willingness to Take Risks - Curiosity
Through: Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 19 - Evaluate Situations

THE LITTLE ENGINE THAT COULD 14 min. - Color
Churchill Films
662 No. Robertson Blvd.
Los Angeles, California

This animated film is based on the children's classic which tells of the little engine that pulled a trainload of toys to the children on the other side of the mountain. Useful for Language Arts activities and explains to children that many things are possible.

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To Develop: Originality - Willingness to Take Risks
Through: Language Arts
Using: Strategies:
No. 2 - Analogies
No. 3 - Sensing Deficiencies

SMALLEST ELEPHANT IN THE WORLD 6 min - Color

Animated adaptation of Alvin Tresset's story about an elephant the size of a house cat and the many difficulties trying to adjust to the new environment. Ideal for primary grades.

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To Develop: Originality - Elaboration
Through: Art
Science
Using: Strategies:
No. 4 - Thinking of Possibles
No. 15 - Process of Invention

COLOR IN CLAY 11 min. - Color

The art of pottery making in England from artist's sketch to finished product. There are many designs of flowers created used in pottery making.

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To Develop: Originality - Curiosity
Through: Art
Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 4 - Thinking of Possibles
No. 23 - Visualization Skills

LEAF 7 min. Color
Santa Monica Films
Los Angeles, California

Autumn in Yosemite National Park shows one golden leaf and how it drifts and is carried about by the gentle breezes and water. As we follow it, all the quiet beauty of the fall season is revealed.

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To Develop: Elaboration - Curiosity
Through: Science
Social Studies
Using: Strategies:
No. 2 - Analogies
No. 6 - Attribute Listing
No. 22 - Creative Listening Skills

BEAVER VALLEY 32 min. - Color

A Walt Disney true-life adventure which shows a beaver dam, inhabitants of the pond, how animals rely on camouflage for safety. Could be used as a nature or science film.

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To Develop: Willingness to Take Risks - Preference for Complexity
Through: Language Arts
Art
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 9 - Examples of Change

STORY OF PETER AND THE POTTER 21 min. - Color

An engaging story of a young boy who watches the creation of a special bowl, intended as a gift for his mother, from the original design on the potter's wheel to the finished glazing and baking.

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To Develop: Curiosity
Through: Language Arts
Art
Using: Strategies:
No. 14 -Intuitive Expression
No. 23 - Visualization Skills

ANDY AND THE LION 10 min. - Color

An iconographic film using the pictures and text of James Daugherty's story for children about the boy who befriended a ferocious beast.

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To Develop: Flexibility - Willingness to Take Risks
Through: Language Arts
Art
Using: Strategies:
No. 1 - Analogies
No. 8 - Examples of Change

A SCRAP OF PAPER AND A PIECE OF STRING 6 min. - Color
National Broadcasting Company

A small piece of string and a piece of paper assume many different shapes and tell of their friendships, their jealousies, mistrusts and envy, and finally realize, as human beings should, the folly of misunderstanding. In a special technique of string animation, the film also points out the usefulness and significance of paper and string in our culture and economy.

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To Develop: Originality - Curiosity
Through: Art and Music
Social Studies
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 11 - Examples of Change

THE SMILE 18 min. - Color

The boy, a novice Buddhist monk in Rangoon, Burma, smiles at many simple but beautiful discoveries as he and an older monk walk the long road to the Great Golden Pagoda for their daily worship..

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To Develop: Flexibility - Willingness to Take Risks
Through: Social Studies
Using: Strategies:
No. 11 - Examples of Habit
No. 16 - Adjustment to Development
No. 19 - Evaluate Situations

ALMOST NEIGHBORS 34 min. - b/w

A middle-class family is forced to feel its involvement with pleasant and unpleasant aspects of society. Application of christian principles emphasizes the impossibility of isolating oneself from one's neighbors.

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To Develop: Curiosity
Through: Art
Language Arts
Using: Strategies:
No. 6 - Attribute Listing
No. 7 - Exploring the Mystery of Things

THE SNOWY DAY 6 min. - Color
Westward Hills
Weston, Connecticut

Quiet fun of a small boy's adventures in the deep snow have the true quality of childhood delights. (See also book, THE SNOWY DAY.)

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To Develop: Originality - Curiosity
Through: Language Arts
Using: Strategies;
No. 14 - Intuitive Expression

HAILSTONES AND HALIBUT BONES 6 min. - Color
Sterling Productions
Div. Walter Reed Co.
New York City, New York

Uses animation to visualize selections from the book, HAILSTONES AND HALIBUT BONES by Mary O'Neill. Celeste Holm reads the poems which are about colors and the way colors can describe moods and objects.

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To Develop: Curiosity - Flexibility
Through: Language Arts
Using: Strategies:
No. 6 - Attribute Listing
No. 7 - Exploring the Mystery of Things

THE RAINSHOWER 14-1/2 min. - Color
Churchill Films
662 No. Robertson Blvd.
Los Angeles, California

Sights and sounds, beauty and rhythm of rain. The film attempts to capture the changing modds of a day when a rainshower comes to plants, animals and people. It offers a rich experience of looking and listening.

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To Develop: Originality
Through: Art
Language Arts
Using: Strategies:
No. 4 - Thinking of Possibles
No. 23 - Visualization Skills

ALEXANDER AND THE CAR WITH A MISSING HEADLIGHT 12 min. - Color
Weston Woods
Weston, Connecticut

Children's drawings create an imaginative tale of a small boy's adventure as he drives around the world in his car with a missing headlight. Based on the story of the same name, the film employs simple animation of the main characters and the car. An enjoyable fantasy in which good photography and children's voices for the narration are thoughtfully combined.

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To Develop: Elaboration
Through: Art
Using: Strategies:
No. 14 - Intuitive Expression
No. 16 - Adjustment to Development

THE DRAGON'S TEARS 6 min. - Color
Contemporary Films

Magical story about the dragon who was moved to tears when invited to a little boy's birthday party.

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To Develop: Flexibility
Through: Art
Language Arts
Using: Strategies:
No. 6 - Attribute Listing
No. 14 - Intuitive Expression

DISCOVERING IDEAS FOR ART 15-1/2 min. - Color
Film Associates of California
Los Angeles, California

Learning to see the differences in things around us which can stimulate artistic invention. Objects occur in great variety, each with a different appearance.

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To Develop: Originality - Elaboration
Through: Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 16 - Adjustment to Development
No. 18 - Interact with Past Knowledge

THE UGLY DUCKLING 7 min. - Color

The famous Hans Christian Andersen story is retold in authentic, charming style. Filmed in Europe, the fable takes on added richness and beauty from its settings as we follow the misfortunes of the unwanted "ugly duckling" who grows into a beautiful swan.

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To Develop: Curiosity
Through: Science
Using: Strategies:
No. 12 - Skills of Search
No. 23 - Visualization Skills

LIVING THINGS ARE EVERYWHERE 11 min. - Color
Encyclopaedia Britannica Films, Inc.

In telling the story of a young boy's discovery of the surprising variety of living things to be found along a river bank and in the woods, this film gives children an opportunity to test their own powers of observation. They will find that living things may be discovered almost anywhere - in water, in the air, in a tree, on a blade of grass, etc.

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To Develop: Flexibility
Through: Arithmetic
Using: Strategies:
No. 4 - Thinking of Possibles
No. 18 - Interact with Past Knowledge

TEN LITTLE INDIANS 11 Min. - Color
Coronet Films

A colorful animated version of the popular nursery rhyme provides this background for understanding the basic concepts of subtraction. Presenting subtraction as the inverse of addition, the film explains the meaning of "take away", "how many more are needed" and to "find the difference".

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To Develop: Curiosity
Through: Science
Using: Strategies:
No. 5 - Provocative Questions
No. 20 - Receptive to Surprise

LIVING THINGS IN A DROP OF WATER 10 min. - Color
Encyclopaedia Britannica Films, Inc.

All children delight in using magnifying lenses and microscopes to discover a new world of tiny, living things. This film uses striking photomicrography to build on this unusual degree of interest. The visuals picture microscopic single-celled and multi-celled plants and animals, and children discover that these have the same life functions as large living things - movement, feeding and reproduction.

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To Develop: Originality
Through: Art
Language Arts
Using: Strategies:
No. 2 - Analogies
No. Ir - Intuitive Expression

THE STONECUTTER 6 min. - Color

This colorful animated film brings to life an ancient Japanese tale of envy and greed - the story of Tasaku, the Stonecutter. In a series of fantastic transformation the Stonecutter is changed into a prince, the sun, a cloud, and finally a gigantic mountain. The strong primary colors have immediate appeal for children of all ages.

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To Develop: Curiosity
Through: Language Arts
Using; Strategies:
No. 5 - Provocative Questions
No. 11 - Examples of Habit

FRISKY THE CALF 11 min. - Color

This is a new Language Arts film. It is a story of a lovable little calf and takes children into the barnyard where they see how the little pet grows up. Designed to stimulate youthful interest in the world about them and provides a valuable background for reading and expression.

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To Develop: Fluency - Flexibility
Through: Arithmetic
Using: Strategies:
No. 2 - Analogies
No. 6 - Attribute Listing

DISCOVERING NUMERALS 9 min. - b/w
Film Associates

This film is designed to lead pupils to a discovery of the difference between numbers and numerals. Number is shown to be a thought about quantity - an idea about "how many". Thoughts cannot be seen or felt but can be shown to tohers in various ways - sets of objects or special marks such as Arabic numberals. This film leads the students to see that a number, an idea of how many, many be shown in different ways.

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To Develop: Flexibility - Curiosity
Through: Social Studies
Science
Using: Strategies:
No. 2 - Analogies
No. 14 - Intuitive Expression

MISS GOODALL AND THE WILD CHIMPANZEES 29 min. - color
Encyclopaedia Britannica Filsm, Inc.

This film shows several of Miss Goodall's discoveries: how the inventive chimpanzees make and use simple tools for catching termites; how they devise "sponges" of chewed leaves to sop up drinking water from tree hollows; and that chimps in the wild hunt, capture and eat other animals.

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To Develop: Flexibility
Through: Social Studies
Using: Strategies:
No. 2 - Analogies
No. 5 - Provocative Questions
No. 14 - Intuitive Expression

THREE COUNTRY BOYS 28 min. - b/w
National Film Board of Canada
New York City, New York

A picture of daily life as experienced by three country boys; one living in Thailand, one in Greece, and the other in Canada. This is a comparitive film showing the responsibilities of boys in different countries.

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To Develop: Originality - Elaboration
Through: Social Studies
Using: Strategies:
No. 4 - Thinking of Possibles
No. 9 - Examples of Change
No. 16 - Adjustment to Development

AUTOMANIA, 2000 11 min. - Color
Contemporary Films

A highly imaginative and sardonic animated film showing the state of traffic congestion throughout the world as it is foreseen at the end of this century. Elaborating upon the wonders of automation in this day, the heights of civilization are finally reached with the invention of a car that can reproduce itself.

- - - - - -

To Develop: Curiosity - Flexibility
Through: Science
Using: Strategies:
No. 6 - Attribute Listing
No. 13 - Tolerance for Ambiguity

SNOW 12 min. - b/w
National Film Board of Canada
New York City, New York

Snow, as it appears in this film, has a character, charm and frailty that excites far warmer feelings than you might expect. You see that its very whiteness has a purpose. You see frost crystals forming in the upper atmosphere, shaping into delicate filigree flakes. The film shows the difference between "powder" and "corn" snow.

- - - - - -

To Develop: Flexibility - Originality
Through: Arithmetic
Using: Strategies:
No. 4 - Thinking of Possibles
No. 5 - Provocative Questions

RYTHMETIC 8 min. - Color
National Film Board of Canada
New York City, New York

Animation artists Norman McLaren and Evelyn Lambert endow the subject of arithmetic with lively humor as numerals indulge in unprecedented antics. The screen becomes a numerical free-for-all as digits meet in playful encounters. Synthetic sounds punctuates the visuals, adding to the fun.

- - - - - -

To Develop: Flexibility
Through: Social Studies
Using: Strategies:
No. 14 - Intuitive Expression

PEOPLE OF A CITY 18 min. - b/w
Encyclopaedia Britannica Films, Inc.

Using an imaginative musical score blended with natural sounds, but without narration, this film provides intimate glimpses of life in Stockholm. Scenes of children at play, the King's guards parading, and a fisherman offer a fresh outlook for world geography on the culture of the Scandinavian countries.

- - - - - - -

To Develop: Curiosity
Through: Art
Language Arts
Using: Strategies:
No. 5 - Provocative Questions
No. 14 - Intuitive Expression
No. 23 - Visualization Skills

ORANGE AND BLUE 15 min. - color
Contemporary Films, Inc.

This film is a visual journey through a junk and surplus yard. It is done as an adventure of two large bouncing balls that explore and play like children. The balls - one orange and one blue - are the essence of childhood, expressing curiosity, adventure, timidity, coyness and joy.

- - - - - -

To Develop: Curiosity - Flexibility
Through: Arithmetic
Using: Strategies:
No. 4 - Thinking of Possibles
No. 5 - Provocative Questions

1, 2, 3. 11 min. - Color
Contemporary Films

An exuberant animation film tracing the history of a truly universal language - math - from its earliest origins. The lively graphics and narration continue a capsule biography of the history of math.

- - - - - -

To Develop: Flexibility
Through: Social Studies
Using: Strategies:
No. 14 - Intuitive Expression
No. 19 - Evaluate Situations

NEIGHBOURS 8 min. - Color
National Film Board of Canada
New York City, New York

A Norman McLaren film employing his "pixillation" technique, in which the principles normally used to put drawings or puppets into motion are used to animate live actors. The story is a simple parable about two people who come to blows over the possession of a flower that grows where their properties meet. The film has neither dialogue or narration, but the action is accompanied by synthetic music and sound effects.

- - - - - -

To Develop: Flexibility - Curiosity
Through: Social Studies - Art
Using: Strategies:
No. 2 - Analogies
No. 9 - Examples of Change
No. 15 - Intuitive Expression

MASKS 12 min. - Color
Film Associates

This film presents one of the world's greatest collections of masks, both primitive and modern. In many societies masks have played an important role in the performance of rituals, in the perpetuation of myths, and in the dramatization of legends. This film helps the student toward an appreciation of the role of masks in the cultural and artistic life of people.

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To Develop: Originality
Through: Language Arts
Music
Using: Strategies:
No. 4 - Thinking of Possibles
No. 19 - Evaluate Situations

A CHAIRY TALE 9 min. - b/w
National Film Board of Canada
New York City, New York

A fairy tale done in a modern manner, told without words by film artist Norman McLaren. The film is a kind of simple ballet of a youth and a common kitchen chair. The young man tries to sit but the chair declines to be sat upon. Musical accompaniment is play on a sitar and drum-like table.

- - - - - -

To Develop: Originality - Curiosity
Through: Science
Art
Using: Strategies:
No. 7 - Exploring the Mystery of Things
No. 10 - Organized Random Search

LASCAUX: CRADLE OF MAN'S ART 17 min. - Color
International Film Bureau

This film deals with the Lascaux Cave paintings discovered in the Dordogne region of France in 1940. The film opens recreating the circumstances which brought about the discovery of the paintings. Two small boys are chasing a rabbit with their dog and fall through the ground into caverns whose walls are covered with the forms of animals - which are the Lascaux paintings. Fantastic art film.

- - - - - -

To Develop: Curiosity
Through: Arithmetic
Using: Strategies:
No. 4 - Thinking of Possibles
No. 14 - Intuitive Expression
No. 23 - Visualization Skills

DANCE SQUARED 3-1/2 min. - Color
National Film Board of Canada
New York City, New York

This film is an encounter with geometrical shapes which children can easily understand and enjoy. As the title suggests, Dance Squared, employs movement, color and music to explore the symmetries of the square. Every movement of the square and its components presents an opportunity to observe its geometrical properties in a way that is intriguing to young minds.

- - - - - -

To Develop: Originality
Through: Language Arts
Using: Strategies:
No. 14 - Intuitive Expression
No. 23 - Visualization Skills

CORRAL 11 min. - b/w
National Film Board of Canada
New York City, New York

The roping and riding of a high-spirited, half-broken horse is the subject for a film which makes visual poetry of this simple theme. Movement and music combine to tell a story without words, set in the foothills of Alberta.

- - - - - -

To Develop: Willingness to Take Risks - Curiosity
Through: Language Arts
Using: Strategies:
No. 3 - Sensing Deficiencies
No. 4 - Thinking of Possibles
No. 18 - Interact with Past Knowledge

CLIFF HANGERS 10 min. - Color
National Film Board of Canada
New York City, New York

Over a gleaming ice field and up steep cliffs of bare rock the camera follows members of the Alpine Club of Canada, to a never before climbed peak in the Canadian Rockies. Before they set out we are introduced to the climbers' basic equipment and learn the uses of rope and ice axe. Arriving breathless at the top, they pause in triumph for a view of the magnificient sea of mountains.

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To Develop: Flexibility - Willingness to Take Risks
Through: Art
Social Studies
Using: Strategies:
No. 9 - Example of Change
No. 11 - Examples of Habit
No. 18 - Interact with Past Knowledge

CHANGING ART IN A CHANGING WORLD 21min. - Color
Film Associates

Through a wide range of visual experiences, this film shows that the entire world in which we live is in a constant state of change. Art for this world also changes. To some people these changes are new and stimulating, to others they are fearful, while others accept change as nothing more than passing excitement. For the artist change goes very deep. It compels him to carefully study the subject, to change and recreate his ideas so as to best express himself in his art.

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APPENDICES

APPENDIX A - ILLUSTRATIVE HANDOUT MATERIALS DEVELOPED FOR TEACHER IN-SERVICE TRAINING PROGRAM

APPENDIX B - INDEPENDENT EVALUATIVE STUDIES CONDUCTED AT

a) MILL MIDDLE SCHOOL,
WILLIAMSVILLE, NEW YORK

b) LECLAIRE ELEMENTARY SCHOOL,
EDWARDSVILLE, ILLINOIS

c) SAINT LEO'S PAROCHIAL SCHOOL,
SAINT PAUL, MINNESOTA

APPENDIX C - SAMPLE IDEAS BOOK

APPENDIX A

Illustrative Handout Materials Utilized During the Five General Workshops

(Answer "yes" if you have some knowledge about the question; "no" if you completely lack any knowledge about the question.)

INFORMATION AWARENESS CHECKLIST

Designed by: Dr. Frank E. Williams

NAME (optional) ______________________________ SCHOOL ____________________

		Yes	No
1.	Have you heard of the Guilford Model of Human Intellect?	___	___
2.	Have you heard of Inquiry Training Programs?	___	___
3.	Have you heard of Bruner's spiral curriculum?	___	___
4.	Do you know anything about Piaget's stage theory of intellectual development?	___	___
5.	Do you know what a teaching strategy is?	___	___
6.	Do you know what divergent thinking is?	___	___
7.	Have you heard of Bloom's Taxonomy of Cognitive Domains?	___	___
8.	Do you know what productive thinking is?	___	___
9.	Would you know how to teach by the inductive approach?	___	___
10.	Can you identify a highly creative child?	___	___
11.	Do you think that discriminating and perceiving are higher mental processes than evaluating or generalizing?	___	___
12.	Do you know what cognition is?	___	___
13.	Have you heard anything about the pre-operational stage of intellectual development?	___	___
14.	Do you think memorization is a mental operation?	___	___
15.	Do you know how to reinforce creative behavior in a classroom?	___	___
16.	Do you associate creative thinking with perceptual learning?	___	___
17.	Have you heard of fluency, flexibility, originality and elaboration as factors of thinking?	___	___
18.	Do you know what productive-divergent thinking is?	___	___

		Yes	No
19.	Do you think hypothesizing and synthesizing are higher mental processes than inferring and analyzing?	___	___
20.	Do you know the difference between inductive and deductive thinking?	___	___
21.	Have you heard of the formal operations stage of intellectual development?	___	___
22.	Do you know what research studies the "120 Mental Abilities of Human Intellect" comes from?	___	___
23.	Is synthesis a higher cognitive domain than analysis?	___	___
24.	Is a transformation on intellectual product produced?	___	___
25.	Have you heard of sensitivity training?	___	___
26.	Do you know what different mind-sets are?	___	___
27.	Do you know what convergent thinking is?	___	___
28.	Is creativity associated with problem-solving?	___	___
29.	Have you heard of spontaneous flexibility?	___	___
30.	Do you think originality is behavior consisting of verbal, figural and symbolic transformations?	___	___
31.	Are there differences between elaborative and original pupils?	___	___
32.	Would you desire to have your pupils learn how to think divergently?	___	___
33.	Do you consider yourself a creative teacher?	___	___
34.	Have you heard of the Imagi-Craft Productions of records to measure creative originality?	___	___
35.	Have you used the books on INVITATIONS TO SPEAKING AND WRITING CREATIVELY?	___	___
36.	Do you know of the Torrance Tests of Creative Thinking?	___	___
37.	Have you used the books on INVITATIONS TO THINKING AND DOING?	___	___
38.	Do you think science can be taught to develop creativity the same as writing?	___	___
39.	Do you expect pupils to be creative at the same time they are learning subject-matter content?	___	___

	Yes	No
40. Do you know what critical thinking is?	___	___
41. Have you heard of Suchman's Inquiry Training Program?	___	___
42. Do you think your classroom needs some new innovations?	___	___
43. Are you a creative person?	___	___
44. Do you think you can teach all children to become more creative?	___	___
45. Have you heard of the Berkeley Studies on Productive Thinking?	___	___
46. Have you read any books on creativity over the past year?	___	___
47. Is elaboration a part of divergent thinking?	___	___
48. Do you know what traits characterize the highly creative person?	___	___
49. Have you heard of Mauree Applegate's "Let's Write" radio series?	___	___
50. Have you heard of the new social studies materials using an inductive approach?	___	___

COMPARISON OF FOUR THEORIES ON THE DEVELOPMENT OF THINKING

Compiled and Designed by: Dr. Frank E. Williams

Formal Operations Stage (age 10 - 16)

Abstract-conceptual thinking
Reasoning generalized
Evaluation
Hypothesizing
Imagining
Synthesizing

Concrete Operations Stage (age 6 - 9):

Analyzing
Conscious of dynamic variables
Measures
Classifies things in groups or series

Pre-Operational Stage (age 2 - 5)

Symbols and representations
Acts on perceptive impulses
Self-centered
Static-irreversible thinking

Sensory-Motor Stage (birth - 2)

Mute - no use of verbal symbols
Learns to perceive - discriminate
and identify objects

Piaget's Stage Theory of Intellectual Development

Level IV

CREATING
Inventing Synthesizing
GENERALIZING

Level III

DEFINING
Discovering-Hypothesizing-Abstracting-Integrating
JUDGING
EVALUATING

Level II

INFERRING
Exploring-Organizing-Analysing
COMPARING AND CONTRASTING

Level I

RETRIEVING
(Reflecting, Remembering, Recalling)
IDENTIFYING
DISCRIMINATING
Perceiving (Sensing)

Hierarchial Schema of Higher Mental Processes

Evaluation:	Judgment by Internal Criteria Judgment by External Evidence
Synthesis:	Derivation of Abstract Relations Production of a Plan-Pattern Production of Uniqueness
Analysis:	Organizational Principles Relationships Elements
Application:	Particular and Concrete Situations
Comprehension:	Extrapolation Interpretation Translation
Knowledge:	Classifications - Categories Sequences - Series Specific Facts Terminology Recall of Information

Bloom's Taxonomy of Cognitive Domains

Implications:	Extrapolating from Givens Sensitivity to Problems (semantic) Elaboration Thinking how Things Lead to or Suggest Other Things
Transformations:	Improvising - Adapting Redefining - Reinterpreting Problems (semant Visualizing (figural) Unusual Uses
Systems:	Code - Equation (symbolic) Drawing (figural) Events (semantic) Sentence (semantic)
Relationships:	Relations Between Perceived Objects, Meanings, and Symbols
Classes:	Ideas or Meanings Syllable and Number Combinations Perceived Objects (lines, forms, shades)
Units:	4. Printed Words (symbolic units) 3. Spoken Words (semantic units) 2. Letters - Forms (figural units) 1. Syllables (symbolic units)

Guilford's Structure of Intellect Products Produced

CLASSIFICATION OF CREATIVE ACTIVITIES AND EXPERIENCES
Into the
PRIMARY MENTAL ABILITIES OF HUMAN INTELLECT

by

Frank E. Williams, Ph.D.

I. Cognitive Ability
discovery, recognition, comprehension, awareness, understanding

Activities that:
- generate curiosity
- provide re-discovery
- require comprehension
- cause awareness

II. Memory
storage and retention of knowledge - what has been cognized
ability to recall information when needed

III. Convergent Thinking
redefinition, transformations, recognized best or conventional solution, improvisations

Activities that: transform, re-define, improvise ability to pick best of choice of several alternatives

IV. Divergent Thinking
scanning stored information, searching for many possible solutions, thinking in different directions, ability to go off in new and untested directions, deferred judgment

A. Fluency: quantitative - emphasize rate within classes

1. Ideational fluency - generation of a quantity of IDEAS, words, titles, responses, phrases, sentences, uses, consequences, productions (drawings, pictures, designs, or other sense stimuli)

2. Associational fluency - completion of relationships - production of relations
generation of synonyms, analogies, similarities, problems of likeness

3. Expressional fluency - new ideas to fit a system or structure organization into systems or logical theories sentences, verbal ideas, question responses

B. Flexibility: quantitative - variety

1. Spontaneous flexibility - variance of kinds of responses into classes
number of considerations of properties, attributes, or inherent characteristics of problem or product
number of shifts of category responses, versatility

2. Adaptive flexibility - number of detours, freedom to make changes, number of approaches or strategies used in seeking solutions - number of changes of interpretations - changes in direction of thinking

C. Originality: qualitative - unusual, remote, clever, uncommon, infrequent, remote associations

verbal, figural, symbolic transformations as uncommon objective unusualness - statistically infrequent - subjective choice as clever, far-fetched, novel, different from standard or norm

D. Elaboration: production of detailed steps, variety of implications and consequences
quantitative measure - number of

V. Evaluative Ability

goodness, suitability, adequacy, determination of fit, ability to determine if produced solution fits the problem (search model)

Activities that: produce conceptual foresight
raise pertinent questions
cause sensitiveness to problems
require curiosity
noticing defects/or changes
seek improvements to things, social customs, institutions, behavior
noting defects in objects or ideas
evaluating implications
observations of imperfections or inadequacies
constructive discontent
flexibility of critical-mindedness
purposeful judgement

FACTORS FOR EVALUATING OR SCORING CREATIVE EXERCISES AND ACTIVITIES

1. Fluency: A score obtained simply by counting the number of all responses given excluding those which are irrelevant or repeated. Sheer quantity counts.

2. Flexibility: A score based upon how response ideas develop and change in terms of:

   a: Manipulation - change color, combination, substitution, subtraction, position
   b: Alteration - adaption, magnification, minification, material change, rearrangement, reversal, shape change, sense appeal
   c: Number of basic principles utilized
   d: Number of inherent attributes of product
   e: Number of classes, or systems used-approaches

3. Originality: Infrequent responses, unusual or remote responses

4. Elaboration: Response must tell what for (why), how or what with.
   Number of details given
   Variety of implications - complexity
   Embellishments shown

5. Inventilevel: adopted from U. S. Patent Office criteria as:

   a: Usefulness
   b: Challenging and thought provoking-generate new ideas
   c: Surprisingness, does the idea produce astonishment, wonder or surprise - real novelty

6. Productivity: Number of complete responses attempted
   Number of questions or activities completed divided by number of possible in exercise

7. Penetration: Number of closures made to incomplete figures, converging to a single answer where an open-ended problem demands many possible answers

EXAMPLES

CREATIVE ACTIVITIES IN LANGUAGE ARTS

Creative Activity: Have pupils think up titles or captions for a picture

Ability Developed: Divergent Thinking
  Ideational Fluency
  Adaptive Flexibility
  Originality

How to: Class activity-titles expressed orally
Individual written exercise

Materials:
1. Clever cover picture from Saturday Evening Post
2. Unusual greeting card or cartoon shown by opague projector
3. Double-page picture from Life or National Geographic magazines.

Scored For: Idea Fluency-number of common titles
Adaptive Flexibility - number of different interpretations of picture
Originality - number of uncommon titles by infrequent occurance in the class or rated for cleverness by the teacher or student panel

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Creative Activity: Write a story about a picture

Ability Developed: Cognitive Ability
Divergent Thinking
Originality
Elaboration

How To: Individual written paper
Individual blackboard activity

Materials: Use same picture from sources above

Scored For: Cognition - awareness of how choice of words can give verbal feeling
- awareness of how new and different words can make story more interesting
- choosing the best way for telling what the picture expresses

Originality - number of unusual interpretations of picture
- humorous or novel twist of story about picture

Elaboration - number of details
- variety of implications

EXAMPLES (con't)

CREATIVE ACTIVITIES IN LANGUAGE ARTS

Creative Activity: To write a short story by using a series of twenty unrelated words in the order in which they are given.

Ability Developed: Divergent Thinking
    Expressional Fluency
    Originality
    Elaboration

How To: Individual written exercise
Class "Round-Robin" story
Group blackboard exercise

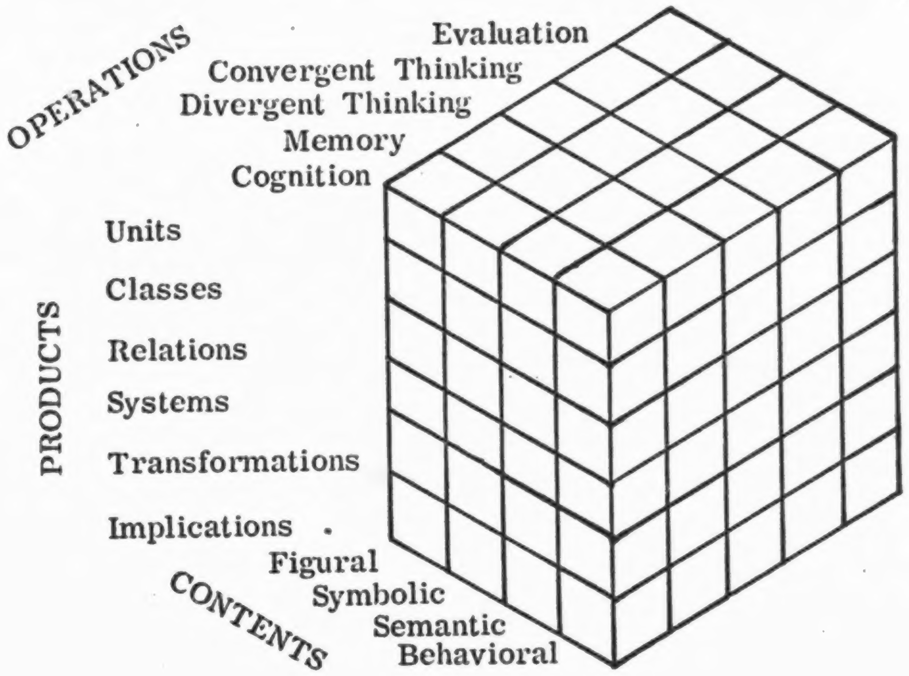
Materials: Writing materials
List of words (see figure below)

Scored For: Expressional fluency - number of new ideas given to each word to fit into a logical story structure
- free and fluent written expression; spelling, punctuation, and grammar are not as important

Originality - quality of clever associations given for each word as judged by the teacher or a student panel
- number of verbal semantic transformations made for each word

Elaboration - variety of implications that the story makes

MAJOR DIMENSIONS OF THE STRUCTURE OF THE INTELLECT


OPERATIONS
Evaluation
Convergent Thinking
Divergent Thinking
Memory
Cognition
PRODUCTS
Units
Classes
Relations
Systems
Transformations
Implications
CONTENTS
Figural
Symbolic
Semantic
Behavioral

Theoretical model for the complete "Structure of Intellect"

STRUCTURE OF THE INTELLECT

In order that the reader may become better acquainted with the theoretical views on intellectual development, as postulated by Guilford, a brief summary is included here. This summary covers the three major dimensions: Operations, Contents, and Products (Guilford and Hoepfner, 1963).

Operations

Major kinds of intellectual activities or processes.

Cognition (C).	To immediately discover, to be aware of, to rediscover, or to recognize information in various forms.
Memory (M).	To commit newly formed or newly active information to memory storage and to retain it for possible use in terms of direct or indirect effect.
Convergent (N).	To produce a single "correct" item of information as in response to a well-structured problem where the specifications are complete.

Divergent (D)	To produce a variety of items of information in some quantity, to produce alternatives possibly fitting criteria that are relatively vague or broad.
Evaluation (E)	To compare items of information with respect to specified known standards of criteria.

CONTENTS

Broad classes of information.

Figural (F)	Concrete information, keeping close to that which is given through the senses. This information can be imagined as well as perceived.
Symbolic (S)	Based upon conventional signs in a system of notation, deriving informational value by their combinations and uses.
Semantic (M)	Information in the form of meanings to which words commonly become attacked.

PRODUCTS

Forms that information takes in the organism's processing.

Units (U)	Relatively segregated or circumscribed items of information having "thing" character.
Classes (C)	Recognized sets of items of information grouped by virtue of their common properties.
Relations (R)	Recognized connections between units of information based upon variables or points of contact that apply to them.
Systems (S)	Organized or structural aggregates of items of information complexes of interrelated or interacting parts.
Transformations (T)	Changes of various kinds of existing or known information or in its use.
Implications (I)	Extrapolations of information, in the form of expectancies, predictions, known or suspected antecedents, concomitants, or consequences.

EXAMPLES OF COMPONENTS

For further clarification, examples of the Structure - of - Intellect Components to be found in items both in the Stanford-Binet and the WISC are listed below:

Using Figural Content

CFT . . . Visualization: To comprehend the new figural inter-relations of elements which result from an indicated change.

EFR . . . Figural relation selection: To choose the figural relation best meeting a stated criterion.

Using Symbolic Content

CSI . . . Symbolic possibilities: To be aware of possible actions in a field of signs, numbers, or code elements; to eliminate redundancy is one kind of such action.

MSS . . . Memory for symbolic patterns: To reproduce or recall inter-relations among sign or code elements.

Using Semantic Content

NMS . . . Semantic patterning: To generate from several given ideas a system in which they are interrelated in terms of their meanings.

EMI . . . Sensitivity to problems: To explain, in some detail, the best description of one's uncertainty in a semantic situation.

POSSIBLE USES

This project would seem to have multiple possible uses in classroom situations for gifted children. Some of these are:

* Helps to differentiate and emphasize the numerous intellectual abilities a gifted child possesses.

* Helps to determine the combinations and clusters of abilities a gifted child displays.

* Asists in identifying diversity of abilities as well as the amounts possessed by a gifted child at the time of study.

* Helps to identify the thinking operations, the content of thinking, and the products of thinking that are employed by a gifted child.

* Provides a theoretical frame of reference within which educational opportunities can be arranged for the gifted child.

* Assists in giving direction and cohesiveness to the management of teaching and learning.

Creativity in Learning

By Dr. Frank E. Williams
Macalester College, St. Paul, Minnesota

This article consists of excerpts from a speech presented at the thirty-first Educational Conference sponsored by the Educational Records Bureau, Hotel Roosevelt, New York City, October 27-28, 1966.

The process of creating is, in large measure, the development of mental skills for associating or putting together in new and original combinations elements of information which one has previously acquired.

Thus, we must consider an originality or inventive factor as well as several kinds of flexibility factors that play a role in creative thought and action. Likewise, the more combinations one can form, the more likely it will be that some of them will be creative. Along with originality and flexibility are various fluency factors such as flow of ideas, flow of associations, and flow of expressions which also are important.

The combining of items of information and the forming of new associations are outcomes of breadth and depth of knowledge, but ability for their production depends on skills and techniques which lead to the establishment of new associations between items of received information.

Increasing the richness of stimulus input into a student's repertoire of knowledge and allowing for a variety of opportunities to work with such inputs seem to be the crux for teaching him to think creatively. However, the mere saturation of an individual with input information may have to be integrated with instructions or cued directions to be creative, opportunities for creating, or training in the utilization of mental processes other than'assimilation, storage, and recall.

The processes of exploring new associations from an array of input information are necessary prerequisites to making discoveries and must be granted students in order to develop abilities for autonomous and creative thinking. Rich sensory inputs may only set the stage for the student providing they are arranged and/or manipulated by the teacher toward this purpose.

Operational definition

There are many different definitions of creativity. However, throughout a diversity of definitions, an amazing consistency can be found.

My definition of creativity is related to the development of intellectual potential through the combining of elements of input information by a productive-divergent thinking process to form a new synthesis of ideas, products, or acts. Teaching for the full development of intellectual creativity becomes one of the most effective ways for implanting knowledge. The task for teachers then is that of structuring knowledge as input information through a multiplicity of teaching strategies in order to have students produce those new associations which are unique within their repertoire of thinking.

Stimulating creativity

Providing opportunities and the means for stimulating intellectual processes which may lead to creative potential in school classrooms are now recognized as important objectives of education. It is quite apparent that educational administrators as well as teachers are aware that attempts to develop creative thinking in the classroom have to be made, but they are also asking some very provocative questions about how this can be brought about. Stimulating the productive-divergent thinking abilities of classroom pupils across the total educative process is received as a highly significant and timely innovation.

However, the process of introducing an innovation in education consists of two phases which the innovation must follow before it appears to any significant degree in school classrooms. One phase is information transmitted about the innovation itself and being understood by those who still bring it about. This paper along with many other current references on creativity in education is an attempt in this direction. Another phase is that of translating into action many applications of the innovation through demonstrations to classroom teachers. Isolated attempts are being made, but a lot of work in this direction still remains. From these isolated attempts to work with teacher groups some clues have appeared which are summarized as follows.

First, research studies suggest that there are many kinds of intellectual thinking processes which students can utilize while simultaneously learning subject matter content. There are a large number of mental capacities which students possess in some degree but which remain virtually untapped in most present day classrooms. Second, research evidence also indicates the necessity for teachers to become sensitized to a wide repertoire of teaching strategies or styles which can be used across subject matter content if the full range of students learning and thinking processes are to be developed completely.

It is possible to stimulate a broader range of mental talent, including intellectual creativity, directly through subject matter content rather than indirectly or in isolation of the regular school curriculum. By so doing, such opportunities will allow students to bring their general intellectual skills to bear upon the many thinking processes which contribute to developing creative potential.

Third, studies have shown that a consistent use of the full potential of mental processes by students, including those that make up intellectual creativity, requires much conscious effort, knowledge about modes of thinking and many new teaching styles on the part of the teacher.

Getting students involved in and committed to the creative process requires teachers who are trained in the use of strategies which develop and guide processes as well as the many skills of productive-divergent and evaluative thinking.

Teachers must be shown how subject matter content can be presented at various conceptual levels which encourage students to aspire toward novelty, develop a fluidity of associations, show flexibility in thinking patterns. and probe new dimensions of knowledge. Stimulating intellectual creativity in the classroom requires challenge and opportunity in a climate where there is acceptance that such behaviors are desired and approved, along with ample experiences for their release. Creative and original responses occurring as an outcome of divergent thinking are dependent upon antecedent knowledge but do not necessarily follow unless conditions are suitable.

There is a great need to retrain teachers in the use of a whole host of different teaching strategies. Then they must be given freedom to explore, design and try out different ways of presenting subject matter content to different kinds of pupils in order to produce learning results that vary in level and type of creativity.

Starkweather has stated that some children become obnoxious as a result of what we do to them in school classrooms. I wonder if this statement should be rephrased to say that some children become obnoxious as a result of what we do not do for them in many school classrooms. Perhaps if teachers understood why and how to stimulate creative potential among all pupils, the part of implementation in school classrooms may more easily become an eventuality.

TRAITS COMMON TO GIFTED AND CREATIVE STUDENTS

by: Dr. Frank E. Williams

1. Displays a great curiosity about objects, situations, or events, Has the capacity to look into things and be puzzled; gets involved with many exploratory type activities, is interested in a wide range of things.

2. Is a self-initiated student, usually needing little help in knowing what to do; starts on his own; pursues individual interests and seeks own direction.

3. Reveals originality in oral and written expression. Consistently gives unusual, clever, unique responses or ideas away from the cliche or stereotype.

4. Has unusual talent to express himself in the arts; i.e., music, dance, drama, drawing, play activities and/or artistic expression.

5. Has the ability to generate many alternatives. Seeks many directions and is flexible in thinking by going at right angles to the main stream of thought in the classroom.

6. Is perceptually open to his environment. Uses all of his senses to be aware of things around him; keenly observant and alert to things that are done as well as things that are not done.

7. Displays a willingness for complexity. Thrives on problem situations; selects a more difficult response, solution or problem over the easier; seeks complex, asymmetrical forms compared to symmetrical forms; has a preference for "digging in" to things.

8. Has the capacity to use knowledge and information other than to memorize, store and recall. Seeks new associations among items of information; combines elements of materials or knowledge in a unique fashion.

9. Shows superior judgment in evaluating things. Reasons things out; seeks logical answers; can see implications and consequences; makes decisions easily.

10. Is a good elaborator. Produces a variety of detailed steps; continually adds on to ideas, responses, or solutions; loves to embellish materials and ideas.

11. Is a good guesser. Is able to hypothesize; is full of wonder about things; is a risk-taker; makes good educated guesses.

12. Makes consistently good grades in most subjects.

13. Learns rapidly, easily and efficiently.

14. Has the ability to see relationships among unrelated facts, information or concepts.

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15. Uses a lot of common sense; seeks the most practical approach.

16. Retains and uses information which has been heard or read.

17. Uses a large number of words easily and accurately.

18. Asks many questions of a provocative nature; inquisitive about knowing why instead of what; has the capacity to inquire.

19. Performs academically at a level two years in advance of the class on one or more disciplines of knowledge.

PERSPECTIVE OF A MODEL FOR DEVELOPING PRODUCTIVE CREATIVE BEHAVIORS IN THE CLASSROOM

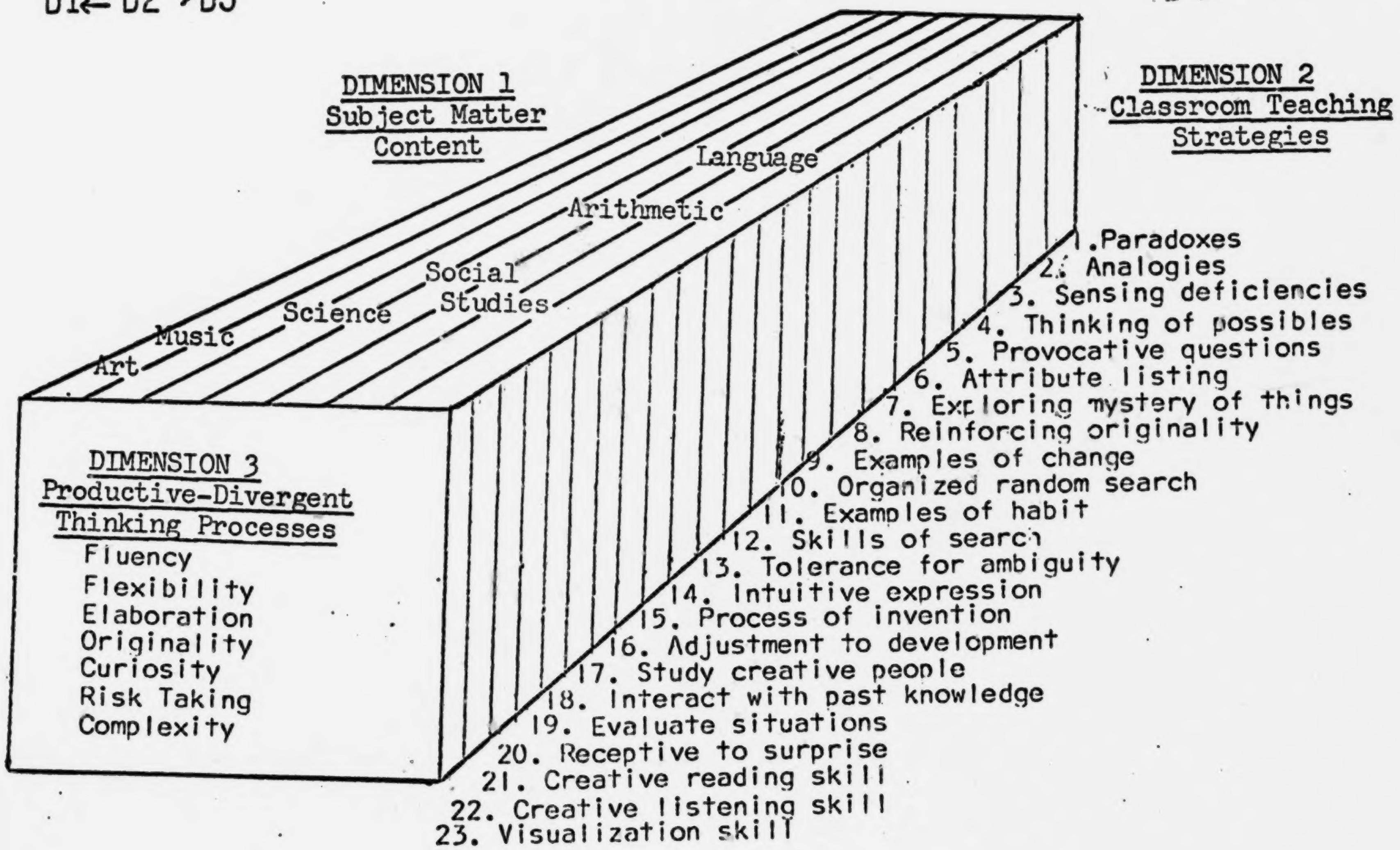
by
Frank E. Williams, Ph.D., Director of
Creativity and National Schools Project
Macalester College

Many teachers are ready to be shown how to use a wide variety of instructional techniques and materials for the development of those mental skills which lead classroom students to think productively and creatively. It is now recognized that the divergent mental capacities of children's intellect should be developed to their maximum potential if education is to more fully meet its total responsibilities. Research studies suggest that there are many kinds of intellectual thinking and learning processes which students can utilize while they are simultaneously acquiring subject matter.content. Research on classroom learning also points out the necessity for innovative teachers who can creatively use a wide repertoire of teaching strategies or styles across subject matter content if the full range of student's learning and thinking processes are to be developed completely. The task for teachers therefore becomes that of exploring ways to set up and conduct educational experiences in the classroom so that students will be given opportunities to develop, utilize and practice as many of these mental processes as possible while learning a given unit of subject matter.

The purpose of this paper is to focus upon a specific model for classroom teaching and to discuss its dimensions in terms of tools which teachers can apply to any type of classroom learning situation. The model takes on the perspective of a three-dimensional cube as shown in Figure 1. It is intended to portray how subject matter content (Dimension 1) can be arranged or manipulated through multiple classroom teaching strategies or styles (Dimension 2) in order to produce those various behaviors affecting productive-creative

MODEL FOR TEACHING
PRODUCTIVE-DIVERGENT THINKING

$D1 \rightleftarrows D2 \rightarrow D3$


DIMENSION 1
Subject Matter
Content
Art
Music
Science
Social Studies
Arithmetic
Language
DIMENSION 2
Classroom Teaching
Strategies
1. Paradoxes
2. Analogies
3. Sensing deficiencies
4. Thinking of possibles
5. Provocative questions
6. Attribute listing
7. Exploring mystery of things
8. Reinforcing originality
9. Examples of change
10. Organized random search
11. Examples of habit
12. Skills of search
13. Tolerance for ambiguity
14. Intuitive expression
15. Process of invention
16. Adjustment to development
17. Study creative people
18. Interact with past knowledge
19. Evaluate situations
20. Receptive to surprise
21. Creative reading skill
22. Creative listening skill
23. Visualization skill
DIMENSION 3
Productive-Divergent
Thinking Processes
Fluency
Flexibility
Elaboration
Originality
Curiosity
Risk Taking
Complexity

thinking (Dimension 3). These three dimensions each consist of various divisions of sub categories. Dimension 2 consists of a list of twenty-three teaching strategies or styles which can be used across the various subject matter areas of a school curriculum; Dimension I for producing the seven mental abilities or behaviors; and Dimension 3 which make up the productive-divergent thinking process. The model is intended to provide a working structure for curriculum planning and change as a guide for teachers to learn how to develop or sensitize students in order that they might be given opportunities to bring all of their general intellectual skills to bear upon productive-creative thinking. The model and the subsequent discussion of its dimensions which follow are intended to show teachers how it is possible to accomplish this task directly through subject matter content rather than indirectly or in isolation of the regular school curriculum. The three dimensions of the model are explained as follows:

Dimension I merely lists the subject matter areas of a conventional elementary school curriculum.

Dimension 2 lists the styles or strategies which teachers can employ in the classroom. All of these are based upon a rationale developed from some research finding either concerning the nature of the productive thinking process, the creative personality, or the classroom climate conducive for productive-creative thinking. The listed strategies become a means through subject matter areas toward an end for fostering an intellectual growth in those behaviors which manifest productive-creative thinking. As one views these twenty-three teaching styles which can be applied across all subject matter areas a vast number of combinations for learning and thinking become apparent. In order to aid teachers in experimenting with ways to utilize each of these strategies, the following examples are cited:

I. Using paradoxes or teaching by examples of paradoxical situations. These are tenets contrary to opinion, situation opposed to common sense but true in fact, or inconsistencies between things people hold as true. For example, in social studies have students think about and explore problems of poverty in the midst of plenty in the world today. Ask students in science to disprove "old wives" tales. This is a technique for sensitizing students to evaluate things and brings about exciting ways for testing and proving.

2. Use analogies or many situations of likeness. Point out new information, facts, or principles by looking at similar situations in terms of things students already know. Show how scientific products have been developed out of analogous situations in nature, i.e., radar invented from the instinct of reflected sound waves among bats; airplane cargo doors designed like the opening of a clam shell; or the built-in-seam of weakness of the pea pod used in the whole area of packaging. Teachers can use animated pictures and films of animals solving problems of existence, survival, and innovation and ask students how their behavior might parallel that of man.

3. Teach by using many examples of deficiencies; that is, ask students to think about what man does not know instead of telling students what man knows. Develop the students skill for looking at gaps, unknowns, or missing elements of information. Allow time for reflective thinking about inconsistencies in knowledge. Point out the difference between problems of fact and problems of logical consistency and how few of the latter kind there are. Use the technique of asking students to list the things that bother people, things people need, or things wrong with something. Ask students to search for all possible definitions of a problem as something that is wrong. Allow opportunities for students to write or tell about all the observable things that to them cause puzzlement (in nature - in human nature, and in the world of things). Cite example where our perceptions in the world of conceptualization do not always match the real world of reality. Provide a "pigeon loft" in the school or classroom where the student can go to wonder. All such techniques aid in developing evaluative thinking.

4. Allow for thinking about possibles, probables, making guesses, or hypothesizing. Provide opportunities for students to answer questions of "what if?", or "In what other ways?" Allow time for guessing and discussing the difference between "wild" and "educated" guesses. Point out how one thing leads to another and the importance of lingering over information or knowledge in order to allow one thing to lead to another. Teach a fact or concept such as a definite process proven and known to solve a problem (algorithm) but allow the student to think of other possibilities that might solve the problem but need not solve it (heuristic).

5. Use the inquiry training method of asking provocative questions. Point out the difference between factual type questions (how much?, how many?, what is?, who?) and questions which require depth of comprehension (how would you?, in what other ways?, what if?, how else?). Use many categories of questioning such as those which require translation, interpretation, extrapolation, identification, discovering, synthesizing, and analyzing. Use pictures and films and have students list all of the questions they can ask about the film. Use a check list of question categories such as, longer, larger, shorter, smaller, adding, multiplying, taking away, changing, combining and reversing. Allow students to be as sensitive to question asking as they are to answer finding.

6. Use the technique of attribute listing or pointing out inherent properties. We do this in many areas such as analyzing the use of a word in a sentence (noun, verb, etc.) or the letters in the spelling of a word, or the numbers or units in an arithmetic problem. Develop the skill of analyzing the inherent properties of a thing by mentally taking it apart and thinking about its parts instead of a whole. For example, in an originality exercise ask for new and unusual uses for commonly known things such as a lead pencil. Then point out how to think in terms of using the inherent properties of its

many parts (wood, lead, rubber, metal, etc.). Such exercises lead to flexible thinking.

7. Provide opportunities for students to explore the mystery of things. Use the technique of doing detective work on the mysteries of nature, science, and social science. In such explorations allow the student to deduce the next step, apply and verify it. Use film to present the mysteries of scientific or social phenomena.

8. Allow for an reward original thinking. Provide opportunties for studies to think of things no one else has thought of. Pose the situation in all subject areas where the student is told he knows more about something than any one else; then have him tell it, write it, or act it. Allow time to reinforce answers different from the ones in the book. Score or penalize a likely response and reward unlikely responses. Conduct an "idea bee", a "question bee", or an "answer bee" like a "spelling bee" where only unusual responses are rewarded the same as the best speller.

9. Cite the importance for change and use many examples of change. Teach the skill for change of things rather than adjustment to things. Use stories and films depicting change in nature and parallel these to human change.

10. Design case study approaches around some organized structure of knowledge which can in turn lead to a random search for other knowledge. Organize information to a certain point and then pose the question, "What would you do?" - - or "would have done?". For example, allow the student to become identified with some historical situation or personality which provides the organized structure but gives no course of action or solution. Then allow the student to search at random what he would have done to solve the problem. Present unsolved social issues or scientific problems and ask the student to go off into his own "unknown areas of information" to seek solutions. Pose the question of how a field of knowledge as it is now conceived might be 50 or 100 years from now.

Identify an area of subject matter by story, picture, or problem and ask the student to generate all of the causes and consequences of that area of knowledge. Use a film which identifies a situation or problem (organized structure) and then stop the film to allow the student to create or design his own information at random to bring the situation to a completion. Upon solving a problem (organized structure) ask the student to think at random about as many problems as he can that the solution might cause (implications).

11. Teach about rigidities, fixations and habit. Show how the lives and functions of men and machines have been influenced by habit-bound thinking. Use examples of principles and techniques; both in the field of arts and sciences, that have remained unchanged or unimproved because of habit. Such examplas in science as jet propulsion, known by the Chinese before the birth of Christ and innovations in the art of communications could be used.

12. Teach the skills of search as ways in which men seek for truths. Teach the processes of the scientific method as well as the basic areas of research. Develop skills in: A.) Historical search - how someone else has done it, or solved it. B.) Desc iptive Search - such as describing, compairing, and contrasting several methods, as well as trial and error search. C.) Controlled search through experimental observations. This involves looking for cause and effect, drawing conclusions, analyzing results, identifying causes and consequences and drawing implications.

13. Build a tolerance for ambiguity by setting purposeful blocks in the learning process. It is well known that students learn when confronted with problem situations. Lead the learning situation up to a definite point and then stop; allowing the student to toy with information; be puzzled, intrigued, involved or challenged. This is a good technique which leads to more self-directed learning.

14. Provide many opportunities which allow for intuitive expression. Ask

students to write, tell, or dramatize their feelings, hunches, intuitions, and emotions about something. Use examples across subject matter areas which show how hunches have paid off. Use other examples of how innovative people have ended up in trouble and why. Provide many opportunities for the expression of feelings across all of the senses; i.e., feel box, color, sounds and noise etc. Use the excellent book and film by Mary O'Neil, Hailstones and Halibut Bones which uses color for the expression of fellings. Torrances' Sounds and Images and records which use unusual sounds for expression of feeling. Use all of the senses for feeling expression.

15. Teach the processes of invention and innovation by using many guided-planned learning experiences. Show how inventions and patents have paid off only through original thinking and sustained effort, hard work, and a great deal of knowledge.

16. Use examples of development instead of adjustment. Show how failures, mistakes, and accident have lead to the development of worth-while things. (serendipity). Even though our culture is strongly success-oriented, use a reverse process by showing how unsuccessful acts or events have been turned to success. Teach the skill of learning how to learn from mistakes. Mistakes are at least proof of an individual's effort. As an example, use some of the films depicting early unsuccessful attempts of man to fly, and point out how the science of flight profited by such mistakes. Use other examples in science and medicine.

17. Study creative individuals in the process under which they create. Analyze the traits and characteristics of eminently creative people through study of biographies and anecdotal data. Study creative people from the standpoint of creating an art out of their own lives - - personal creativity. Study the process of creative people interacting with other people - - social creativity. Study the process and development of a creative product -

productive creativity. Use career films showing creatively successful people on the job. Point out idiosyncrasies of creative people; i.e., early life anxieties, conflicts, fears, uncertainties. Emphasize how problems were overcome or contributed to a persons own creativity. Show how truly creative behavior comes out of personal and social discomfort and maladjustment, deep concern and a great amount of perseverence.

18. Allow students to interact with themselves and their past knowledge. Provide them many opportunities to toy with information that they already know instead of always expecting them to continue acquiring new information. Teach the skill of how to nurture infant ideas by combining new associations out of what is already known. Provide students with a multitude of experiences for doing something with facts and information which they already possess. Allow many experiences for categorization behaviors including opportunities to classify information and to discriminate between kinds and types of information.

19. Evaluate solutions and answers in terms of their consequences and implications. Always pose the questions "what if?" Provide opportuntties for listing things that might happen as a result of - - . Teach for cause and effect and require the students to extrapolate from information.

20. Develop skills in being receptive to surprise and unexpected responses, ideas or solutions with an alertness to their significance. Use many examples of constructive discontent. This implies not only being discontent about something but also being able to generate some constructive ideas of how the things might be improved. Teach for the skill of embellishing or elaborating upon information or knowledge. Show how old items can be used in new ways by adding motion, color, odor, light etc. Teachers as well as students should learn how to handle and capitalize upon surprizing responses in the classroom. Take advantage of the significance of unusual, remote responses.

21. Develop skills in reading creatively. Ask students to state as many ideas as they can which occur to them during their reading rather than to state specifically what it was that they read. Point out the difference between reading as an information acquiring process, and reading which leads to idea generation and development. Reading can teach a student about someone elses ideas or information but it can also stimulate the student to new ideas and information of his own.

22. Likewise, develop the skill of listening creatively. Listen for information which leads to other things rather than only what was heard.

23. Emphasize and practice the skill of simple perception. Draw attention to shapes, colors, rhythms, textures, sounds and odors. Provide opportunities for students to perceive or visualize themselves in many contexts. For example, ask the student to perceive himself as a molecule undergoing the process of osmosis, etc. Provide many opportunities for the student to find gratifications in perceiving with all his senses the world in which he lives.

Dimension 3. In order to measure and/or observe the thinking behaviors brought about by the utilization of the various teaching styles or strategies across subject matter content as discussed above, those primary mental abilities which make up the productive-divergent process are now defined.

Fluency consists of a quantitative measure as a generation of a number of questions, responses, ideas, or products. The number or flow of (sheer count) relevant responses produced by the student yields the measure of fluency.

Originality consists as a qualitative measure of unusual, remote, clever or uncommon question, responses, ideas, or products. The statistical infrequency of questions, responses, or ideas produced across the total class by any student or the extent to which the response represents a new approach, mental leap, or departure from the obvious and commonplace occuring within the class yields the measure of originality.

Flexibility consists of a quantitative measure as the number of shifts in producing questions, responses, ideas, or product s. By counting (sheer number) the detours, categories, changes of approaches, or changes in direction of thinking one can measure flexibility.

Elaboration consists of the production of detailed steps, variety of implications or the ability to embellish or expand upon questions, responses, ideas or products. It is a quantitative measure which involves detail and specificity to responses or questions.

Curiosity is the capacity of the student to look into things and be puzzled. It is an observable trait associated with classroom behavior which involves exploratory type activities.

Willingness To Try Difficult Things consists as a trait of risk taking. It is likewise a trait that teachers can observe when high levels of aspirations are sought after and tried out by the student. Therefore, it involves thinking as well as doing, and is generally a manipulative activity.

Preference for Complexity consists as an extension of elaboration when the student prefers the richness of embellished question, responses, ideas, or products instead of the common place. The student who displays a preference for "digging" to complex designs and complicated realms of information can be observed by the teacher as possessing this trait.

CLASSIFICATION OF QUESTION CATEGORIES TO CUE VARIOUS LEVELS OF THINKING RELATED TO BLOOM'S SEQUENTIAL CLASSIFICATION OF THE COGNITIVE DOMAIN

Designed by: Dr. Frank E. Williams

Knowledge (memory questions)
Tell - list - describe - who - when - where - which - what - do you remember - state - does - define - identify - did you know that - relate -

Comprehension (translate)
Change to different symbol or medium - tell in your own words - describe how you fell about - relate - interpret- compare and contrast - what is an analogy to - when can you extrapolate from that - discover and explain - what does it mean - what are the relationships -

Application (problem-solving)
Demonstrate - use it to solve - where does it lead you - how can you use it -

Analysis (reached, derived)
How - reason - why - what are causes - what are consequences - what are the steps of the process - how would you start - arrange - specify the conditions - which are necessary for - which one comes first, last - what are some specific examples of - list all the problems, solutions -

Synthesis (Productive-divergent thinking, originality and imagination)
Create - devise - design - how many hypotheses can you suggest - think of all the different ways - how else - what would happen if - think of as many as you can - what it would be like if - how many ways are possible - compose - develop - in what ways can you improve - suppose - form a new - think of something no one else has thought of before -

Evaluation (judge to a standard, set criteria)
Set standards for evaluating the following - which are good, bad - which one(s) do you like - what do you think are the most likely - rate from good to poor - select and choose - is that good or bad - weigh according to - evaluate the results - judge the evidence - judge according to these standards - judge by how you feel - what is the problem - are these solutions adequate - will it work - decide which -

CURRICULUM PLANNING
Using
HIERARCHICAL SHEMA OF MENTAL PROCESSES AND BLOOM'S TAXONOMY

By:

Frank E. Williams

To Develop: Four Levels of Thinking

Through: Language Arts (understanding the verb)

Level 1 - Look at these words
- which ones tell what is happening or what action is taking place?
- which ones do not make nouns move?
- how many verbs can you think of to explain what I am doing?
- what are action words called?

Level 2 - Arrange the following words into nouns and verbs
- compare these two lists of words and tell me how many verbs are in each
- from your list of verbs explaining what I was doing, (analyze) can you tell me which ones more nearly explain my action?
- Organize these words into a sentence
- explore this sentence in your book, can you think of other words which would better tell the action taking place? (make inference--assigning meaning beyond what data given)

Level 3 - Here are 6 action words to explain this picture, rate them from good to poor as words which you think adequately tells what is happening - give your criteria for selection
- which of these verbs carry more meaning and why?
- in what ways might we change these sentences to tell what is happening more interesting
- which of these verbs do you prefer -- give your reasons

Level 4 - Suppose you have a friend who has been blind since birth and has never seen an animal move, design a new kind of communication system to explain the movements of different animals to him
- translate action words in nature to explain, human nature,scientific or mechanical devices
- form a new and different way to explain the movements of an Hawaiian dancer
- what would happen if man was unable to move how could he defend, survive or entertain himself?
- Devise an original means for explaining the plays of a baseball game to a non-English speaking foreigner who had never seen a baseball game before

To Develop: Four Levels of Thinking

Through: Social Studies (Constitutional Government)

Level 1 - Without referring to your books, tell which western countries were practicing some kind of constitutional government in the 18th centry.
- Tell when the first American constitutional convention occurred - what date
- which of the following nations now have a constitutional government similar to ours?
- Who can remember what three major events in American history led to the adoption of the constitution?

Level 2 - What are the similarities and differences between our Minnesota State Constitution and the Constitution of the United States?
- What would life be like in Saint Paul if there were no city constitution under which we live and operate?
- Study the constitution of our school and compare it to that of the state - similar - different?
- Consider the events leading up to the adoption of the U.S. Constitution, what do you think life would have been like for the next 50 years if it hadn't been adopted? Explore - predict.

Level 3 - Specify the essential qualitites of constitutional government
- From among these 6 different constitutions, which ones would you most prefer to live by - least prefer to live by- Why? Give your reasons.
- Here are three new kinds of constitutions, which one would be most appropriate for St. Leo's School - justify your reasons for making that selection.

Level 4 - Suppose you were a U.S. Senator, write a new constitution for North Vietnam to live by that would solve their present problems.
- As a result of this study design a new constitution to live by when a colony of men discover and are transported to a distant planet.
- How could men of government devise a world constitution to unite all of the nations together under one world government?

To Develop: Six Thinking Processes (Bloom's Taxonomy)

Through: Social Studies

Using: A Paradox
America is the greatest and richest country in the world, yet a great amount of deprivation and poverty exists.

Bloom - knowledge:
- tell what percent of Americans are classified as disadvantaged.

- what states have the greatest poverty problems?
- describe the kind of communities that are in poverty.
- do you know how much gap exists between cost of living and income?
- what index is used to indicate the total of our goods and services
- what is the average income of an American family?
- how many families live with an income below this average

comprehension:
- tell in your own words what it would be like to be poor and live in a depressed area
- list the characteristics or attitudes of an economically deprived community
- describe how you would feel about living in one of these communities .
- compare and contrast Highland Park to Dale-Selby area
- what does a paradox mean?
- can you comprehend living in a poor Puerto Rican section of New York City -- write a story of what you think it would be like

application:
- how could the mayor of Saint Paul solve the problem of poverty
- if your family was real poor, what would or could you do
- discuss some of the national programs to alleviate this problem
- how could you use some of these approaches to solve the problem here in Saint Paul?

Analysis:
- list causes of poverty,why do poor communities develop?
- specify the conditions under a free enterprise system that leads to poverty
- specify the conditions of man that might cause him to be poor.

Synthesis:
- how could you design an economic system that would eliminate poverty
- think of a new and unique system of government that would erase all forms of poverty
- consider one condition leading to poverty and create a new solution to this problem
- what would happen if all men were to share in the total wealth of the nation?
- suppose that the U. S. were to put all its money spent for defense into helping the poor--what do you think would happen
- how many ways, new ways, would be possible to help the poor

Evaluation:

- if this were to happen what would be the results?
- rate those solutions from good to poor - what criteria
- given these three forms of government, evaluate each in terms of their effects on the poor
- here are five possible solutions - weigh these according to
- what problems would arise if there was no poverty in the US
- given these three utopian societies if you were poor which one would you prefer to live under - why?

To Develop: Flexibility Through: Language Arts Using: Paradox

The (s) sound is represented by other letters (c, s, x) and not by just the letter (s). Paradox - the (s) sound is represented by the letter (s) only.

Materials Used: words in reading story, children's names, charts, flannel board, spelling words.

Results: Help in sounding out words based on phonetic analysis which involve one sound represented by other letters.

Other Directions: detour D other sounds and represented letters - sh - (s, tion, etc.) z - (s, z) k - (k, c).

Parts of Speech - list of words that express feeling classed as parts of speech.

Nouns: music fire color Cardinals rose war love parade riot drums

Adjectives: gaudy bright patriotic loyal catastrophic disastrous sensational huge mysterious gigantic solid

Verbs: screeched scream gurgled secure slither fluttered flared sail scolded creeped trembled rattled leaped squirm vibrated sparkled squelched wiggle

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To Develop: Fluency Through: Language Arts

It is Friday the 13th. The teacher is confronted with the many superstitions that are recalled on this day.

Activities:

1. List as many of the superstitions as you can.
2. List the ways you think these started.
3. Find as many ways as you can to disprove these.
4. List as many of these superstitions that you think were legitimate in their time.
5. List as many as you think are being practiced today.
6. Draw pictures showing consequences for not being cautious.
7. Dramatize one of these tales and have the children identify it.
8. Record sounds that might occur if old wives tales are not observed.

Paradox to cue curiosity thinking: "An Individual is innocent until proven guilty."

Cues:

If a speeder is innocent, why is he sometimes confined to jail? or fined?

If you are vacationing, going through many states, are you responsible to know individual state laws?

Questioned appeared about parental monetary responsibility on TV wherein observed father is liable up to and until fact is established in court, but not thereafter. Here the father is guilty until the fact is proved.

If you are riding in a car at the invitation of a friend and during the ride the driver's ownership is questioned about going across a state line, you are guilty by society and considered so by jury until you've proved your innocence?

To Develop: Curiosity and fluent thinking Through: Social Studies

Using: Paradoxes #1, #4, #5, #11

The children were shown a picture of Charles E. Wilson, former President of General Motors and were given a mimeograph sheet with a short bibliography of his life. We then showed a large overlay with the following quotation: "What's good for General Motors is good for the country." The children were asked to explain what our country would be like today if this became a truth in our government. After a discussion on this, I showed them a picture of Parnelli Jones, turbo-jet racer, from the recent Indianapolis 500 and asked if they could explain why the large auto companies have been reluctant to mass-produce the turbine car and how this statement of "What is good for General Motors is good for the country" compares with this reluctance.

To Develop: Curiosity, fluency, and originality Through: Social Studies

Using: Paradox - thinking of possibilities, sensing deficiencies and analogy

Europeans of 1400 felt that the world was flat, yet in reality we know it to be round.

List the sources of information that European map makers used.

While standing on the shore, how would you account for the fact that you see the sails last on a ship leaving port?

How do you suppose Columbus kept his sailors from turning back?

What do you suppose happened in the European mind when a creative child who was exposed to a creative teacher came home and said "The world is round"?

How would life on a space platform compare with life as Europeans knew it in 1490?

To Develop: Curiosity Through: Social Studies Using: Paradoxes

Leading Statement:

"Many of us believe that all national and world leaders have been tall men - Washington, Lincoln, Johnson, DeGaulle!" Read, check records of height, etc. and discover more concerning world leaders including names of persons who were not tall - Napoleon, Stephen A. Douglas, etc.

To Develop: Flexibility Using: Paradox

A city in the South has erected a monument to the boll weevil. How does the boll weevil effect the cotton crop? How do the people of the cotton farming area feel about the boll weevil? In how many ways does the boll weevil become harmful to people? Contrary to motion, imagine how this insect's presence proved beneficial to a cotton farming area. Imagine the new customs and daily activities adapted by these people since the tragedy. Was this a tragedy? Explain why or why not. Name all the different equipment needed now in the community. Explain the various modifications in the area's economy.

Results: The children should be able to change the direction of their thought.

Using paradoxes in a Social Studies class on the Civil War.

Everyone believed that Lincoln was opposed to slavery everywhere. In reality, he was not.

What if Lincoln had lived? How do you think that the history of the U.S. would have been changed, especially the relationship between the North and the South and the problem of slavery? How might the Negro's life in our country be different today?

To Develop: Curiosity Through: Social Studies Using: Paradoxes

The students were asked to explore the paradoxical situation: Cave men were big and strong. This led the class to the realization that many things we have common notions about are opposed to factual truth.

To Develop: Originality Using: Paradox

"A straight line is/is not the shortest distance between two points."

Tell the students to measure the shortest air route from St. Louis to Moscow. Allow them to use wall maps, atlases, and globes. The students would be instructed to tell the air distance in miles as measured by the scale on the particular map or globe they used.

Result: Hopefully someone will use a globe and discover that the great circle routes are shorter than the straight line routes drawn on mercator maps.

To Develop: Flexibility Through: Science Using: Paradox

The stars twinkle. The stars appear to twinkle. What are stars? How far are they from the earth? What size are the stars? Do stars give off light? Stars don't shine in the daytime. Stars shine all the time. Why don't we see the stars in the daytime? Experiment - look at the sky at night. Materials: Show films of the appearance of the stars, library books and science book - children give reports.

To Develop: Flexibility Through: Science Using: Paradox

Paradox - The sun appears to move from east to west daily.
Materials: Filmstrips, globes, solarium, science books, encyclopedias.

Variety of ideas - The earth revolves around the sun on a fixed orbit once a year. - The sun's gravity keeps the earth on its path. - The earth rotates once each day on its axis.

Number of different approaches - Demonstrate with two children representing the sun and the earth. - Demonstrate with a globe and a flashlight.

To Develop: Flexibility Through: Science Using: Paradox

The sun rises in the morning and sets at night. (Aurora drives his chariot across the sky.) Actually the sun is still and the earth moves. Telephone poles seem to move as you travel although you are moving. The opposite: You feel you are moving while in a train when actually other trains are moving. - Sensation of standing still in a jet. - Water seems to be going past you when you are in a boat. The sun shines at night. Children on the other side of the world are awake while we sleep. The sun seems near but if it is far away the light form the sun seems colorless, and when refracted by rain it forms a rainbow (all the colors).

Materials: Globe, prisms.

To Develop: Flexibility   Through: Science   Using: Paradox

The destruction of one thing often brings life to something else. It may be the regeneration of the same species. It may be renewing present life. Use the leaf of a decorative rubber plant. Grow a new plant in a terranium-shriveled old leaf to new plant. The children wanted to try it: suggests the possibilities of other leaves, stems, and seeds. The death of the digital gives life to heart patients. The death of a mold plant gives life to strepticocus - pneumonia patients. The death of plants (humus) is used for the growing of other plants.

To Develop: Flexibility   Through: Science   Using: Paradox

The earth is round yet it looks flat. Look at the "coming together" of the horizon. Cut a large (24") circle. Then cut a 1/4" sector from it and show that the edge looks flat. Pick up a marble and close your hand over it. You can feel the roundness. Then use a large beach ball and let a small child place his hand on the ball. He can't feel the entire ball. Hold a tennis ball close to your eyes. You can see that it is round. Then hold a large beach ball close to your eyes. You cannot see the entire ball and thus its roundness. Then think about a big ball like the earth. Since the earth is so large we can't see all of it until we get away into space.

Materials: Globe, two pieces of paper - one for the sky, the other for the earth.

To Develop: Originality   Through: Art   Using: Paradox #1
No's 3, 5, 7, 18, 19, 23

Paradox: The hue of yellow remains the same regardless of where it is placed.

We've been having fun painting with the primary colors. Look at your work. Have you noticed or discovered anything happening when you place two of the colors near to each other? What did you notice? Would you like to try it again? Place a large area of yellow next to one of blue. Could we say that the color yellow as we have used it still looks the same when we place it next to blue? I wonder if it would look the same next to, or placed on other colors. Could you perform some experiments with colored paper, paint or chalk to discover if anything happens to the original yellow color? Try some paper sculpture to see what the reaction is. Look out the window at the yellow house. Is it the same color of yellow no matter where you look? Lead into perspective effect on color - the new terms of tint, tone, shade - how can we change the yellow to get the effects we want?

DEMONSTRATION LESSON UNIT

Subject:	Language Arts	Teacher:	Mrs. Connie Pival
Topic:	"A Consideration of the Relationship Existent Between Various Members of the March Family"	Location:	N.O. Nelson Elementary School Edwardsville, Illinois
Source:	Little Women by Louisa M. Alcott		

The construction of this lesson was based on the

Model For Teaching Productive-Divergent Thinking

a schema developed by

Dr. Frank E. Williams
Director, Creativity and National Schools Projects

I. To Develop: Fluent Thinking

Fluency pertains to a quantitative measure - the number of questions, responses, ideas, or products. The flow of relevant responses produced by the student yields the measure of fluency.

Activity: List all the forceful adjectives you can think of which might describe any of the various relationships which exist between various members of the March family. After brainstorming for a period of time, use these adjectives, proper nouns lifted from the family group, etc., to construct analogies. In the composition of these analogies you may establish relationships between this suggested material and any other appropriate objects, conditions, etc.

Strategies: No. 2 - Analogies

II. To Develop: Original Thinking and Risk-Taking

Originality is a qualitative measure of unusual, remote or clever responses, questions, ideas, or products. The extent to which they represent a new approach, mental leap, or departure from the obvious and commonplace yields the measure of originality.

Risk-Taking involves a willingness to try difficult things. It involves goal setting as well as doing.

Activity: Propose a relationship between two rather obscurely related nouns. Compose a cinquain which pertains to some aspect of the circumstances existent in the first five chapters of Little Women.

Strategies: No. 2 - Analogies, No. 10 - Organized Random Search

III. To Develop: Flexible Thinking

Flexibility measures quantitatively the detours, changes of approach, and new adaptations of familiar objects.

Activity: What are some inherent conditions of masculinity? In what ways (intellectually, emotionally, psychologically, etc.) do males differ from females? What if the March family had contained 5 boys instead of 5 girls? What are all the ways in which such a condition might have altered the plot? What are some ways in which the tone and mood might have been effected by such a change?

Strategies: No. 4 - Thinking of Possibles
No. 5 - Provocative Questions
No. 19 - Evaluate Situations

APPENDIX B

INDEPENDENT EVALUATION STUDIES CONDUCTED AT THREE PROJECT SCHOOLS

a) Mill Middle School,
Williamsville, New York

b) LeClaire,
Edwardsville, Illinois

c) Saint Leo's,
Saint Paul, Minnesota

MILL MIDDLE SCHOOL PILOT STUDY ON
CREATIVE THINKING

By: Dr. Frank E. Williams

Mill Middle School is located in the village of Williamsville, a suburb of Buffalo, New York. During the past two school years it was a project school affilliated with the National Schools Project directed by Dr. Frank E. Williams at Macalester College, Saint Paul, Minnesota, which is sponsored by the U.S. Office of Education. Dr. Sidney J. Parnes, Professor of Creative Studies, Buffalo State University College, was a consultant for this project and conducted bi-monthly teacher in-service training for the twelve sixth-grade teachers and three administrators of this school.

These twelve sixth-grade partially trained teachers utilized the sixteen booklets of the Crutchfield Productive Thinking Program, Series One: General Problem Solving, as treatment material in their classrooms. The booklets of this program were administered twice a week, Tuesday and Friday, during the regular reading period to all sixth grade students (N=250) which comprised the experimental group. Criterion measures consisted of Forms A and B of the Torrance Tests of Creative Thinking, Figural and Verbal, administered pre and post treatment in December 1966, and again in May, 1967.

A matched control group consisted of sixth-grade students at Heim Middle School also in Williamsville, New York. Matching was accomplished across scores on the Lorge-Thorndike Intelligence Test, the Metropolitan Achievement Test (sixth-grade), and sex. The control group (N=89) was likewise administered pre and post criterion measures at the same time as the experimental group, but its teachers were not trained and treatment consisting of the Crutchfield Productive Thinking Program was not utilized. Sixty-nine matched pairs of sixth-grade students were used for final statistical analysis.

Table I indicates means of raw scores for experimental and control groups on the three scored factors for each of the criterion tests used, Figural and Verbal.

These data are now being transferred to a computer for conversion to standard scores, computation of means, standard derivations and levels of significance via a three-way analysis of variance.

At the conclusion of treatment of the sixteenth booklet of the Productive Thinking Program nine of the twelve teachers asked their students to comment in writing about these sixteen booklets of this program. Tables 2 and 3 indicate a rank order analysis of these comments across each of the nine teachers.

Table 2 indicates distinct differences among teachers in regard to number of positive responses given by pupils to the open-ended question: "The program and booklets were ______________________". Those actual responses which pupils used which indicated positive reactions are shown at the bottom of Table 2. Likewise, those actual responses which pupils used which indicated negative

TABLE I

Mean Scores Pre and Post for Experimental and Control Groups On Three Factors of Creative Thinking

	Pre Test Verbal				Pre Test Verbal		
Experimental	V	Fluency	82.9	Control	V	Fluency	83.8
Group	V	Flexibility	35.7	Group	V	Flexibility	33.4
N=69	V	Originality	48.0	N=69	V	Originality	44.2

	Post Test Verbal				Post Test Verbal		
Experimental Group	V	Fluency	89.1	Control Group	V	Fluency	82.6
	V	Flexibility	41.9		V	Flexibility	41.3
	V	Originality	72.6		V	Originality	71.1

	Pre Test Figural				Pre Test Figural		
Experimental Group	F	Fluency	21.2	Control Group	F	Fluency	22.4
	F	Flexibility	16.7		F	Flexibility	17.9
	F	Originality	27.7		F	Originality	30.6

	Post Test Figural				Post Test Figural		
Experimental Group	F	Fluency	24.0	Control Group	F	Fluency	21.4
	F	Flexibility	17.6		F	Flexibility	16.7
	F	Originality	25.4		F	Originality	22.8

TABLE 2

Rank Order of Mean Positive Responses

Teacher	Number of Pupils	Number of Positive Responses	Mean	Number of Neutral Responses
1	30	43	1.43	4
2	31	31	1.00	0
3	27	24	.88	0
4	25	21	.84	0
5	30	22	.73	1
6	30	20	.66	2
7	29	19	.65	3
8	28	18	.64	1
9	29	16	.55	5
Totals 9	259	214		16

Positive Responses - Interesting, fun, exciting, good, great, sharp, educational, mysterious, helpful, enjoyable, realistic, taught me to think, helped me to use my mind, helped me to solve problems.

Neutral Responses - OK, fair, so-so

TABLE 3

Rank Order of Mean Negative Responses

Teacher	Number of Pupils	Number of Negative Responses	Mean	Number of Uncategorized Responses
7	29	19	.65	1
1	30	12	.40	7
9	29	11	.37	3
4	25	7	.28	4
5	30	8	.26	11
6	30	8	.26	1
2	31	6	.19	7
3	27	2	.07	2
8	28	1	.03	0
Totals 9	259	74		36

Negative Responses - Boring, bad, dull, stupid, uninteresting, unrealistic, waste of time, unworthwhile

Uncategorized Responses - Easy, hard, not what I expected reactions are shown at the bottom of Table 3. Even though there were almost two-thirds less the number of positive responses indicating negative reactions by pupils to the program, again distinct differences appeared among teachers.

Following the open-ended questions, pupils were asked to indicate why they responded as they did. Figure I lists the frequency of these "why" responses again by positive or negative reactions.

Figure I

Frequency of "why" Responses Categorized by Positive or Negative Reactions

Positive Responses Why Pupils Liked The Program		Negative Responses Why Pupils Did Not Like The Program	
Made me think	20	Too much writing	22
Fun to solve problems	16	Boring	14
Like to solve mysteries	8	Too easy	11
Made me think new ways	6	Too many pages	11
Liked to work alone	5	Too many questions	6
Helped me to read better	4	Not natural situation	6
Stories were at our level	4	Not enough facts given	5
Exciting	4	Too many lines to fill in	4
Unusual, different	3	Too long	3
No source of information	2	Could never happen	3
Made me think faster	2	Did not like to work alone	3
Pupil had to do all thinking	2	Not interesting	1
Filled in reading time	2	Books need better art work	1
Do imaginative things	1	Hard to solve problems	1
Not afraid to tell new ideas	1		
Characters interesting	1		
Helped to develop more ideas	1		
Total	82	Total	91

As Figure I shows the pupils reported they liked the program because it caused them to think and solve problems. However, they also displayed their dislike of the program because it required too much writing, was too long, and the sixteen booklets were viewed as causing boredom because of repetition.

After the training program the principal of this school was asked to rate each of the nine teachers who had participated in the study as being a highly creative and innovative teacher, an average teacher being less creative, or as being a traditional teacher who would be less prone to innovate and be creative. This principal had participated in all previous training sessions with his teachers and was not only well informed about the subjects but had many opportunities to work with and observe teachers attempting to be creative and generate ideas.

Tabel 4 compares the rank order of pupils' positive and negative responses to the Crutchfield Creative Thinking Program and the principal's rating of these teachers.

TABLE 4

Rank Order Of Pupil's Positive and Negative Responses About The Creative Thinking Program by Teacher and Teachers' Rating on Creativity.

Rank Order of Pupil's Positive Responses to the Program by Teacher	Rank Order of Pupil's Negative Responses to the Program by Teacher	Principal's Rating of Teacher being High, Avergae, or Low on Creativity
Teacher No. 1	Teacher No. 7	Teacher No. 1 - Average
Teacher No. 2	Teacher No. 1	Teacher No. 2 - Average
Teacher No. 3	Teacher No. 9	Teacher No. 3 - High
Teacher No. 4	Teacher No. 4	Teacher No. 4 - High
Teacher No. 5	Teacher No. 5	Teacher No. 5 - High
Teacher No. 6	Teacher No. 6	Teacher No. 6 - High
Teacher No. 7	Teacher No. 2	Teacher No. 7 - Average
Teacher No. 8	Teacher No. 3	Teacher No. 8 - Average
Teacher No. 9	Teacher No. 8	Teacher No. 9 - Low

Conclusions to be drawn from Table 4 are that apparently some of these teachers did establish an accepting or rejecting climate for the Productive Thinking Program. Table 4 indicates that the High Creative Teachers numbered 4, 5, and 6 were rank ordered in these respective positions with regard to both pupil's positive and negative responses. These highly innovative and creative teachers did not obtain the largest number of pupil responses indicating they liked the Program nor did they obtain a large amount of responses indicating dislike for the Program. Teacher No. 3, likewise being rated as High creative, received more pupil's positive responses (rank order No. 3) along with a lower number of pupil's negative responses (rank order No. 8). This teacher probably had established a more favorable attitude toward the program. Teacher No. 9, rated low in creativity, received the least number of pupil's positive responses (rank order No. 9) and stood high on number of pupil's negative responses (rank order No. 3). This teacher no doubt created a very unfavorable climate toward acceptance of the Program. Those teachers rated average in regard for their abilities to innovate and be creative had mixed reactions among pupils either accepting or rejecting the Program. Average teacher No. 2 probably set a favorable climate for the Program whereas average teacher No. 8 apparently established a very complacent attitude toward the Program.

RESULTS OF IN-SERVICE TRAINING PROGRAM AT LECLAIRE ELEMENTARY SCHOOL IN EDWARDSVILLE, ILLINOIS[1]

In-Service Training Program:

During the 1966-67 school year, the entire staff (N = 26) of an elementary school volunteered to participate in an inservice training program designed to build an understanding of various aspects of creative-productive thinking. It was hoped that teachers would gain sufficient knowledge so that they would be able to apply their learning in such a manner that pupils would have an opportunity to utilize their creative potential while engaged in the study of the normal school curruculum. The objectives of the training program were:

1. To bring about a consciousness on the part of teachers of the vital need to develop both their own and pupils' creative-productive thinking potential.
2. To motivate, instruct, and provide opportunities for teachers to utilize their creative potential in their day-to-day instructional tasks.
3. To assist teachers to understand the creative thinking processes so that instructional strategies would be designed to cultivate the creative potential of pupils.
4. To seek ways in which instructional media might best be used for the cultivation of the creative potential of pupils.

The course consisted of twenty (20) fifty-minute meetings held at the close of classes, but during the "working day." Two evening conferences, one classroom visitation by consultants, two planning sessions, and pupil testing sessions were held in addition to the instructional sessions. Training was designed to allow a maximum of participation and involvement. Planning, reporting, and discussion by teachers occupied an estimated forty percent of the instructional time. Activities which called for teacher participation received major instructional emphasis.

Course of Study:

1. The need for a more creative trend in education. Opinions of: educators, psychologists, public servants, and representatives of business and industry. The development of all known intellectual potential, and the cultivation of creative thinking as a legitimate and highly desired goal of education.
2. Definition of creativity and discussion of the creative processes as related to: thinking, learning, and problem solving. Six factors: (a) problem sensitivity, (b) fluency, (c) flexibility, (d) originality, (e) redefinition, and (f) elaboration.

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[1] Eberle, Robert F., "Training and Teaching For Creative-Productive Thinking", Illinois Plan For Program Development For Gifted and Talented Students, Office of the Superintendent of Public Instruction, Springfield, Illinois, 1967.

3. Characteristics of creative children and adults. Ideal Child Check List.

4. Guilford model of the structure of human intellect. Discussion of convergent versus divergent thinking. Bloom's Taxonomy of Educational Objectives, Cognitive Domain.

5. Comparison of four theories of the development of thinking. Higher level thought processes and the hierarchical nature of the levels of thinking.

6. Discussion of research findings on the relationship of creativity to intelligence, grades, age, achievement, and cultural discontinuities.

7. Psychological, perceptual, and environmental inhibiting and facilitating factors of creative-productive thinking.

8. Discussion of assessment devices for measuring creative-productive thinking behavior. Examples of tests available and scoring techniques. Administration and scoring of tests of Divergent Thinking and Possible Jobs.

9. Discussion of the principles of: deferred judgment, attribute listing, forced relationships, constructive discontent, and solo and group ideation.

10. Project model with a discussion of instructional strategies for developing creative-productive thinking: (a) subject matter content, (b) classroom instructional strategies, and (c) creative-productive thinking behaviors.

11. Sensory experiences for teachers and pupils.

12. Questioning as a means to elicit kinds of thinking.

13. Examples of media devices used to evoke creative behavior: (a) books, (b) films, (c) audio tapes, (d) filmstrips, and (e) pictorial materials.

14. Classroom activities for teaching creativity as developed by individual teachers.

15. Examples of subject matter being taught creatively.

Two evaluative studies were conducted at this school on effectiveness of such training.

Study No. I measured four second grade classes and three third grade classes (N = 192) using the Torrance Figural Test of Creative Thinking, Form A and B. Form A of this test was administered before teacher training in January, 1967, and Form B post training in May of that same year. Figure I indicates pre and post mean scores for each class and a computation of their difference. It will be noted from this Table that all classes except one gained significantly on post test mean scores from pre test mean scores. This would indicate that training of teachers had some effect on creative thinking performance of children. There were limitations to the study because of lack of time and money, but the study does show the need for further and more complete data.

Figure I

Pre and Post Mean Scores on the Torrance Figural Test of Creative Thinking

Grade	N	Group	Pre Scores Mean	Post Scores Mean	Difference
2	21	Low	203	217.50	+ 14.50
2	24	Average	219.24	200.05	- 19.19
2	32	High Average	166.90	198.80	+ 31.90
2	29	High	215.15	229.59	+ 14.44
3	25	Low	165.91	193.87	+ 27.96
3	31	Average	160.60	207.73	+ 47.13
3	30	High	161.17	212.59	+ 51.42

A second study consisted of an anlysis of teacher responses to a descriptive inventory of behavioral changes brought about by in-service training in creativity. During the second semester of the 1966-67 school year, the entire staff of the LeClaire Elementary School, N = 26, participated in an in-service training program designed to sensitize them to instructional aspects of creative-productive thinking. This study was undertaken to determine some of the behavioral changes of staff members that might have occurred as a result of such training. It was hypothesized that: "Teachers can be sensitized via an in-service training program on creative-productive thinking so that they change their classroom styles or strategies for teaching subject matter more creatively." It was hoped that through a knowledge gained in the creative-productive thinking processes that teachers would modify their instructional strategies so that pupils would have greater opportunity to exercise these thought processes.

Twenty instructional sessions of fifty minute duration, a total of approximately seventeen hours, were held at the close of classes, but during the "working day." The course of study is described elsewhere in this report. Two evening conference sessions, which included three hours of instruction, were also held. Dr. Marie Hughes of the University of Arizona and Dr. Frank E. Williams of Macalester College were featured conference speakers. Dr. Hughes and Dr. Williams also served in a consultative capacity to the experimental school teachers for a period of one day. This time was spent in visiting classrooms, answering questions, and giving aid and suggestions to teachers.

As a means of determining staff reaction to the training and in an attempt to determine the degree and kinds of behavioral changes that may have occurred, an inventory was devised and administered at the close of training. Teachers were encouraged to read each statement of the inventory carefully and to "give serious thought" to their responses. In view of the experimental nature of the project, the respondents were encouraged to be completely frank in their appraisal; anonymity was guaranteed. It is believed that honest and sincere responses were given.

In view of the major emphasis placed on self improvement in the training program, the greater majority of the inventory statements were directed toward evaluating this particular aspect of training. Other categories of statements included: staff improvement and pupil improvement. Table I indicates staff responses in each of the three categories and compares the degree of behavior changes that were experienced.

TABLE I

	Little or No Change	Some Change	Great Change
Self Improvement:			
N = 28 Statements	≤ = 81	≤ = 281	≤ = 333
Total Responses = 695	M = .12	M = .40	M = .48
Percentages	12%	40%	48%
Staff Improvement:			
N = 10 Statements	≤ = 18	≤ = 117	≤ = 115
Total Responses = 250	M = .07	M = .47	M = .46
Percentages	7%	47%	46%
Pupil Improvement:			
N = 4 Statements	≤ = 4	≤ = 36	≤ = 59
Total Responses = 99	M = .04	M = .36	M = .59
Percentages	4%	36%	59%

The strength of the responses was determined by assigning weights as indicated in Table II. The statements are numbered as they appeared on the inventory, however, they have been categorically classified. The figure given in the right hand column is the arithmetical mean score.

TABLE II

ANALYSIS OF DATA ON DESCRIPTIVE INVENTORY REGARDING BEHAVIORAL CHANGES BROUGHT ABOUT BY THE IN-SERVICE TRAINING OF TEACHERS IN CREATIVE-PRODUCTIVE THINKING

WEIGHTED RESPONSE:
Little or No Change = 1.00
Some Change = 2.00
Great Change = 3.00

SELF IMPROVEMENT:
N - 28 Questions

ITEM #		Mean Score
1.	I find myself more open-minded to the ideas of others than before training	2.36
2.	I am more observant than before the training	2.72
6.	I have gained a workable knowledge of the creative-productive thinking processes	2.42
7.	Need for new ideas, differing instructional strategies, variety of teaching approaches	2.58
8.	I have gained an understanding of my own creative talent	2.37
9.	I can now make meaningful use of my own creative talent	2.42
10.	My tolerance of new ideas and receptivity to new instructional approaches has increased since training	2.44
13.	My school and life interests have broadened	2.28
15.	My self-confidence has increased	2.23
16.	More encouraged to make increased and more effective use of instructional materials	2.53

TABLE II - Continued

ITEM #		Mean Score
18.	An introspective analysis of what I do in the classroom now goes on constantly	2.38
20.	A change has occurred in my breadth and enjoyment of reading	1.87
21.	My sense of humor has improved	1.70
23.	Ability to think up a quantity of ideas in solving problems has increased	2.53
25.	The ratio of "pupil talk" compared to "teacher talk" has increased in my classroom since training	2.44
26.	I am more aware of what is happening in my classroom	2.50
28.	I am now more conscious of what I say to pupils and how I say it	2.52
32.	I care more about what takes place in my classroom	2.20
33.	I believe I am a better teacher as a result of the in-service training	2.20
34.	My attitude toward teaching seems "less anxious" than in the past	2.04
35.	I find myself more inquisitive than before training	2.37
36.	I find myself a more active participant in discussions than before training	1.79
37.	I am more apt to try different approaches to doing something than before training	2.46
38.	I find myself more aware of problems and challenges than before training	2.48
39.	I tend to exert more effort in mental tasks rather than quitting so soon	2.17
40.	I find that I am better able to develop my ideas and put them to use than before training	2.37
41.	I believe that I will be able to make use of what I have learned in my future teaching	2.84
42.	I have found the training helpful in my life's activities in general	2.24

TABLE II - Continued

STAFF IMPROVEMENT:
N = 10 Questions

ITEM #		Mean Score
3.	The educational program of the school has been advanced	2.56
4.	A greater willingness to try new instructional strategies now exists within the staff	2.68
11.	The staff now has an improved appreciation and understanding of instruction and problems	2.23
12.	Staff initiative has strengthened and anxieties have lessened in our school this year	2.08
14.	A new and contagious enthusiasm has welled-up within the staff	2.37
19.	As a result of training, an increased feeling of belonging and an improved "esprit de corps" in the staff	2.28
24.	A new kind of friendliness and mutual respect exists within the staff since training	2.25
29.	Teachers listen with greater interest to description of classroom activities	2.50
30.	Teachers are more willing to tell other staff members about things they are doing in their classrooms	1.96
31.	The staff has an increased understanding of inter-relationship of teaching tasks at all levels	2.32

PUPIL IMPROVEMENT:
N = 4 Questions

ITEM #		
5.	I am convinced that cultivation of creative-productive thinking abilities is a legitimate goal	2.57
17.	My pupils have been able to perform a greater variety of accomplishments	2.27
22.	My pupils have developed a greater variety of thinking skills as a result of my teaching this year	2.04
27.	Different pupils are now making classroom contribution, "new contributors since last fall"	2.57

TABLE III

CHI SQUARE ANALYSES OF RESPONSE PATTERNS ON DESCRIPTIVE INVENTORY

ITEM #	HIGHS	LOWS	CHI-SQUARE	SIGNIFICANCE
1.	12	13	0	.99
2.	19	6	5.76	.02*
3.	14	11	.16	.70
4.	17	8	2.56	.20
5.	25	1	20.34	.001***
6.	12	14	.04	.90
7.	14	10	.375	.70
8.	12	14	.04	.90
9.	13	13	---	---
10.	14	11	.16	.70
11.	10	16	.96	.50
12.	7	18	4.00	.05*
13.	9	16	1.44	.30
14.	10	16	.96	.50
15.	9	17	.54	.50
16.	19	7	4.65	.05*
17.	7	17	3.38	.10
18.	20	6	6.50	.02*
19.	9	16	1.44	.30
20.	4	20	9.38	.01**
21.	1	23	18.38	.001***
22.	11	14	.16	.70
23.	15	11	.35	.70
24.	8	16	2.04	.20
25.	13	12	---	---
26.	15	9	1.04	.46
27.	16	8	2.04	.20
28.	16	9	1.44	.30
29.	13	11	.41	.70
30.	18	7	4.00	.05*
31.	9	16	1.44	.30
32.	11	13	.41	.70
33.	8	17	2.56	.20
34.	8	16	2.04	.20
35.	11	13	.41	.70
36.	3	21	12.04	.001***
37.	13	11	.41	.70
38.	14	11	.16	.70
39.	7	16	2.78	.10

TABLE III - Cont.

ITEM #	HIGHS	LOWS	CHI-SQUARE	SIGNIFICANCE
40.	11	13	.41	.70
41.	21	4	10.24	.01**
42.	9	16	1.44	.30
43.	15 vs 7 vs	5 (3 df)	6.22	.05*
44.	14	11	.16	.70
45.	22	3	12.96	.001***
46.	8	17	2.56	.20
47.	24	1	19.36	.001***

In addition to the analysis made by weighting, the responses were also subjected to statistical analysis to further determine significance. These results appear in Table III. The response scale, consisting of five alternatives, was dichotomized to include in one category the relatively non-committed responses of "very little" and "somewhat". As might be expected in this type of study the alternative "not at all" was rarely checked. In the second category were the alternatives "a good deal" and "a great deal." Both were viewed as suggesting substantial change with little psychological justification for attempting to distinguish between them. With this categorization of what might be called "no change" versus "change", chi square was then used to test the observed frequencies for the categories against an equal probability hypothesis. On the basis of the computations, the following conclusions seem justified:

For #2: Teachers consider themselves substantially more observant than before the training. Sig. at .02 level.

For #5: Teachers are convinced that the cultivation of creative-productive thinking abilities of pupils is a legitimate educational goal. Sig. at .001 level.

For #12: "Staff initiative has been strengthened and anxieties have been lessened in the school this year." The response pattern here is significant because of the concentration in the relatively non-committal areas. Hence the interpretation: No substantial change in staff initiative and anxiety level. Sig. at .05 level.

For #16: Apparently the staff feels more encouraged to make increased and more effective use of available instructional materials. Sig. at .05 level.

For #18: Teachers are now more introspective. Sig. at .02 level.

#20: Significance here is due to concentration in low side. Evidently little change has occurred in their breadth and enjoyment of reading. Sig. at .01 level.

#21: Apparently little improvement in "sense of humor." Sig. at .001 level.

#30: Teachers are more willing to tell other members of the staff about the things they are doing in their classrooms. Sig. at .05 level.

#36: Little change has occurred in teachers' degree of participation in discussions. Sig. at .001 level.

#41: Teachers feel training can be utilized in future teaching. Sig. at .01 level.

#43: Teachers obviously prefer the in-service training. Sig. at .05 level.

#45: Teachers found the training as a whole enjoyable. Sig. at .001 level.

#47: Participants would advise their "teacher friends" to engage in the study of creative-productive thinking. Sig. at .001 level.

For the remaining items the response frequencies for each of the categories could be attributed to chance.

RESULTS AND DISCUSSION:

The training program, and hence, the behavioral change inventory, was based on the premise that teachers could be "sensitized" to concepts and instructional strategies leading to a more creative-productive teaching and learning experience.

The data cited in Table II provides information of an attitudinal nature. The responses being selected for discussion represent an Arithmetical Mean of 2.50 or higher. While these scores could be attributed to chance, as represented on Table III, nevertheless, it is felt that the movement toward significance is worthy of discussion.

Teachers acknowledged the need for new ideas, differing instructional strategies, and the use of a variety of teaching approaches. This led to a greater willingness on the part of staff members to try new instructional strategies in the classroom. Teachers became more conscious of what was said to pupils and how they said it. They also gained a greater awareness of what was happening in the classroom. Teachers sensed that different pupils, new stars, were making classroom contributions as a result of the use of different instructional strategies. Teachers indicated that their own ability to think up a quantity of ideas in solving problems had increased. They also revealed that they listened with greater interest to discussions of classroom activities given by other teachers. It was also felt that, as a result of training, the educational program of the school had been advanced.

The statistical analysis described in Table III seems to justify the following conclusions: Teachers considered themselves substantially more observant than before training; they also gained in the ability to examine their own thoughts and feelings. Apparently the staff gained encouragement to make increased and more effective use of available instructional material. Teachers became more willing to tell other members of the staff about the new instructional techniques and strategies that they used in their classrooms. Teachers were convinced that they will be able to make use of what they learned in their future teaching and that the cultivation of creative-productive thinking abilities in children is a legitimate educational goal. As a whole, teachers found the training enjoyable. The participants indicated that they would advise their "teacher friends" to engage in the study of creative-productive thinking. The above findings were significant at the .05 level or better. The results cited here tend to support the hypothesis that "Teachers can be sensitized via in-service training programs on creative-productive thinking so that they change their classroom styles or strategies for teaching subject-matter more creatively."

The responses to the inventory represent the attitudinal set of an entire school faculty that volunteered to participate in the in-service training program. Recognizing attitudinal set as a determiner for behavioral change, it appears that certain behaviors of the trained teachers were modified and that these changes are basic and supportive of creative-productive teaching and learning. The evidence points to the suitability and acceptability of such training for the broad range of teacher talent, experience, and intellectual sophistication that may be found in an elementary school staff. It is believed that classroom teachers can benefit by such training and that their instructional styles and teaching strategies can be changed. Such change would more nearly allow the intellectual potential of elementary school pupils to be cultivated in its entirety.

CREATIVE THINKING AND PERSONALITY: AN EXPLORATORY STUDY OF THEIR RELATIONSHIP IN THIRD AND FOURTH GRADE CHILDREN

By Dr. Frank E. Williams

Introduction

No one as yet has devised a fully satisfactory way to measure creativity. Yet, we know that creative potential, as much as intelligence, is responsible for scholastic achievement in school and success beyond formal education.

The matter of measuring and identifying students who might possess high creative potential is rather new. Teachers and counselors are vitally interested in restructuring the curriculum in order to better accommodate creative talent, or in some cases, even developing special programs for creative students in order to challenge and motivate them in a special way. Yet this presupposes adequate assessment devices for identifying those students who possess a high degree of creative talent. Educators are raising some rather provocative questions about what creativity tests to use, what they really measure, and seriously searching for possible measurement strategies or alternatives for identifying creative abilities among classroom students. A review of the literature on identifying and assessing creativity reveals several approaches of which the following two are of interest here.

One approach has been the development of paper and pencil tests to measure various process functions related to thinking that have appeared important to creativity. The first major efforts toward this process approach began over a decade ago by Dr. J. P. Guilford at the University of Southern California and Dr. Viktor Lowenfeld at Pennsylvania State University. These two researchers and their colleagues uncovered, simultaneously but independently in separate fields of endeavor, identical mental abilities underlying creative skills in science and in the arts. Since that time, Professor Guilford has been instrumental in developing a number of test exercises, mostly for adult groups, which measure those supposed intellectual abilities most important to the creative problem-solving process.

Subsequent to this earlier work, Dr. E. Paul Torrance then at the University of Minnesota, modified some of Guilford's test exercises and developed a whole new set of tests for young children measuring the same supposed intellectual abilities. These tests are now being used predominently by classroom teachers and educational researchers interested in assessing a student's creative potential in terms of his ability in handling certain creative thinking processess. However, even though somewhat reliable, these tests are complicated to score and have questionable validities. That is, the question of whether they really do measure creative potential has still not been answered, and some studies show that there seems to be little relationship between scores on such tests and actual productive thinking performance resulting in creative ideas, products, or acts. The most disturbing issues involved with the use of such tests are that they consist of artificial exercises unrelated to practical or socially relevant performance; they are timed and it is difficult to comprehend that creativity can be turned on and off again by a clock; and their scoring procedures are highly subjective and very time consuming even for a trained scorer.

A second approach for identifying creative potential has been concerned with examining the highly creative person who has made creative contributions or in which the creative process has occurred and studying his or her traits, characteristics, or attributes. This approach has consisted of studies of highly creative groups of people and is exemplified by the work of MacKinnon and his associates at the University of California at Berkeley. Others such as Taylor, McGuire, Cattell, and Drevdahl have been involved in collecting personality and/or biographical background data on groups of eminently creative individuals with attempts to determine which of their characteristics are related to creativity.

For example, Cattell and Drevdahl (1955) compared a group of one hundred and forty eminent physicists, research biologists, and psychologists selected for high creative productivity with a control group of less creative output but equal academic standing. A profile of personality factors based on the results of the study revealed marked differences between the two groups. The experimental group of creative scientists appeared much stronger in ten personality factors, such as reservation, intelligence related with abstract thinking, soberness, assertiveness, venturesomeness, sensitiveness, imagination, forthrightness, experimental behavior and self-sufficiency. Essentially the same profile of differences were discovered in a similar group involving creative people in art and literature. These researchers then concluded that personality and temperament differences may be more stable and basic than special ability differences measured by creativity tests. Test instruments that supposedly indicate a profile of personality attributes have been constructed but have only been used to a limited extent for predicting whether a person has motivation and temperament contributing toward high originality and productivity in long term, real life situations. These tests which are available attempt to assess factors which constitute a creative personality profile are the Sixteen Personality Factor Test for Adults (16 PF) and the Junior-Senior High School Personality Questionnaire (HSPQ) for adolescents, both developed and designed by Dr. Raymond B. Cattell at the University of Illinois.

A pilot study was conducted at Ball State Teachers College (1966) administering the usual measures of scholastic achievement and the Sixteen Personality Factor Questionnaire (16PF) to entering college freshmen as a comparative study for predicting college success. The purpose of that study was to explore differences between high-creative and low-creative students as identified by a creative personality profile obtained from answers on the 16PF. These two groups of students were then compared on scholastic achievement measures; such as, achievement test scores, grade-point average, college dropout rate, and on a measure of anxiety. Results of the study showed that high creative personality profile students received higher achievement test scores, higher grade-point averages, remained in school longer, and among the males were less anxious. Upon measures of anxiety the opposite trend was found for females. No attempt, however, was made to validate personality data with actual scores on creative thinking tests. To our knowledge a comparison of creative personality traits with creative thinking skills has never been reported.

There are two other studies of interest which one of the authors has been associated with in attempts to measure creative personality trait modifications as a result of some kind of training. Eberle (1967) reports upon a study of an experimental group of eighth grade students exposed to creative processes training for thirty class periods throughout the school year. Pre and post tests of creative thinking and the HSPQ were administered to both the experimental group and a matched control group. Findings indicated that four of the seven factors of this test which comprise a creative personality profile yielded personality modifications in favor of the experimentally trained gorup. Test performance of experimental subjects on the personality traits of being reserved (A), serious (F), sensitive(I), and self-sufficient (Q_2) appeared stronger after creative processes training. The main conclusion from the study points to the fact that personality correlates were modified by training, and that the kind and duration of creative processes training given to the experimental group caused these subjects to respond more as resolute, sensitive, resourceful individuals who became accustomed to making their own decisions and to think more on their own.

Another study was conducted by Hagander (1967) using matched fifth-grade pupils as experimental and control groups. The Torrance Tests of Creative Thinking and Cattell's Children's Personality Questionnaire (CPQ) were administered to both groups pre and post training. The experimental class received twenty-five creative writing lessons via fifteen minute audio tapes followed by forty-five minutes of creative story writing and telling. The CPQ was scored for those seven factors relating to a creative personality profile and each factor was analyzed. One of the seven factors, Factor E Dominance, yielded a highly significant gain ($P > .001$) in favor of the experimental subjects after training. None of the other six personality factors approached significance. His results indicated that the experimentally trained subjects of this age level became significantly more assertive, self-assured, and independent-minded.

Only very recently have researchers been exploring combinations of the two approaches discussed above by measuring creative thinking skills concurrently with creative personality profiles. No one as yet has tested the possibility of substituting a test for determining creative personality profiles in place of a creative thinking test. The purpose of this study was to seek relationships between scores on creative thinking tests designed around the thinking process approach and scores on a personality test associated with the approach of measuring personality traits and characteristics contributing to creativity. It was assumed, if significant relationships could be established between both test measures, that considerable time and scoring effort could be saved by utilizing the Children's Personality Questionnaire for younger subjects when desiring to assess creative potential since these tests can be machine scored without the problems of scoring difficulty and subjectivity which are serious restrictors in the use of creative thinking tests. This study was designed to identify creative personality trait profiles of third and fourth grade pupils and compare these to the creative thinking skills of fluency, flexibility, and originality.

Tests:

The two tests used in this study were as follows. One was a test developed by Dr. E. Paul Torrance at the University of Georgia called the Torrance Test of Creative Thinking. This is a paper and pencil test designed for young children. This test supposedly measures various process functions related to thinking that have appeared important to creativity. The disadvantage of this test is its difficulty in scoring and its questionable validity.

The other test used in the study was developed by Dr. Raymond B. Cattell and his associate, Professor John Drevdahl then working at the University of Illinois. These two researchers compared 140 eminently creative scientists selected for high productivity with a control group of other scientists whose output was less creative but who had equal academic standing. A profile of personality factors based on the results of the comparison revealed marked personality differences between the two groups. In the results of the first group of high creatives there appeared ten personality factors which were much stronger than in the second group of less creative individuals. The same personality profile was later obtained in another study of creative people in the arts and literature. The Children's Personality Questionnaire (CPQ) is a test to identify seven of these ten creative personality factors among young children and was the test used in this study to determine personality traits and characteristics of the subjects of this study.

Subjects:

The subjects of this study were pupils of a mixed third and fourth grade class at Saint Leo's School in Saint Paul, Minnesota. The children ranged in age from eight to ten years old. There were eight boys and four girls in the third grade, and twelve boys and eight girls in the fourth grade. Total number of subjects in the study was thirty-two (N = 32).

Method:

First, The Torrance Test of Creative Thinking was given to the entire group of subjects. This test consisted of a single colored 2" x 2" slide picture of Old Mother Hubbard presented by a projector on a screen.

There were three tasks assigned and each task had a five minute time limit. The first task was to ask questions about the picture which could not be answered by looking at the picture; the second was to guess causes for the action in the picture; the final task was to guess consequences resulting from the picture. Each of these tasks was scored for the three creative thinking skills of fluency, flexibility, and originality.

The Children's Personality Questionnaire (CPQ) was administered approximately two weeks after the Torrance Test of Creative Thinking. The seven factors scored on this test were those factors which Cattell had found to contribute the most to a creative personality. These seven factors are listed in Figure I. The seven factors were weighted as directed by Information Bulletin #10 (1963) and converted to standard scores.

Personality Factors Related to Creativity Measured by The Children's Personality Questionnaire.

Factor A: reserved, cool

Factor B: intelligent

Factor E: assertive, aggressive

Factor F: sober, serious

Factor H: venturesome

Factor I: sensitive, tender-minded

Factor N: forthright, natural

Figure I

To answer the research question of this study, is there a correlation between certain personality factors and creative thinking performance, the subjects were ranked from high to low in terms of their total creative thinking score obtained from the Torrance Tests of Creative Thinking. The three highest and three lowest scores from third grade subjects and three highest and three lowest scores from fourth grade subjects on the Torrance Creativity Test were ordered; then these scores were correlated with the same pupil's scores on the Children's Personality Questionnaire by means of rank order correlation coefficients.

RESULTS

In order to correlate the Torrance Test of Creative Thinking with the Children's Personality Questionnaire, only total scores were used. The sums of subfactors comprising the total scores on the Torrance Test and the CPQ are shown in Tables I and 2 by grade level.

Rank Order of the Three Highest and Lowest Raw Scores on the Torrance Test of Creative Thinking with CPQ Scores for Third Grade - N = 12

Torrance Test of Creative Thinking				total score	CPA Weighted Stens Factors							total score
Student	Fluency	Flexibility	Originality		A	B	E	F	H	I	N	
1	26	17	27	70	2	10	4	4	10	2	9	41
2	23	17	24	64	10	6	4	16	5	14	6	61
3	17	10	23	50	8	16	5	12	8	2	5	56
9	12	12	13	37	14	12	7	8	9	8	5	63
10	12	12	13	37	10	10	7	16	4	14	5	66
11	10	5	14	29	4	16	6	12	7	12	10	67
12	8	7	5	20	12	4	5	12	7	4	5	49

Table I

Rank Order of the Three Highest and Lowest Raw Scores on the Torrance Test of Creative Thinking with CPQ Scores for Fourth Grade - N = 20

Torrance Test of Creative Thinking					CPQ Weighted Stens							
Student	Fluency	Flexibility	Originality	total score	A	B	E	F	H	I	N	total score
1	26	15	34	75	14	12	7	8	9	8	5	63
2	23	19	28	70	6	14	5	16	6	10	6	63
3	25	19	25	69	14	10	7	6	4	10	2	53
18	10	10	12	32	12	16	6	12	2	10	6	64
19	13	12	5	30	14	10	6	10	7	12	9	68
20	9	8	10	27	14	12	2	14	5	10	5	62

Table 2

For each child's total creativity score found on the Torrance Test of Creative Thinking the three factors of fluency, flexibility and originality for each of the three tasks (nine scores) were summed. For each child's total personality profile found on the Children's Personality Questionnaire, the weighted standard scores for each of the seven personality factors contributing to creativity were summed. The rank order correlation coefficient for third grade pupils was -.366. To be significant at the .05 level of confidence, the coefficient would have to be greater than +.786 or less than a -.786; while it would have to be greater than +.929 or less than a -.929 to be significant at the .01 level of confidence. The rank order correlation coefficient for fourth grade pupils was -.128. For an .05 significance level, the coefficient would have to be greater than +.886 or less than a -.886; and for a .01 level of significance greater or less than 1.00. Thus, at both grade levels, scores for the same child on the Creative Thinking Test and the Children's Personality Questionnaire were independent of each other.

SUMMARY

This study has attempted to answer the question, "Is there a relationship between a child's performance on a creativity test and certain personality factors contributing to creativity?" The answer as indicated by the results of the study does not indicate any relationship as far as the measures used in this study. It has not been shown, of course, whether no correlation actually exists between creative performance and personality factors, or whether the tests of both factors which are presently available do not measure the correlation which may exist. It is clear from the results that two different behaviors are being measured by the tests used in this study. What has been illustrated in this study is that the two types of creativity tests, those measuring creative factors of personality and those measuring creative thinking performance may not be substituted for each other as measures of the same child's creativity.

Teachers and counselors interested in assessing creative potential must be aware of deficiencies which continue to exist in available testing devices. Restrictions on the use of one test designed for measuring creativity, however, may be no more serious than for any other single measurement device when purporting to assess human potential. Multiple assessment devices seem to still provide the best approach; and this study provides clues which point to the necessity of using several kinds of tests, creative thinking as well as personality and others, when attempting to measure various kinds of talent as complicated and diverse as those which constitute creativity.

One of the most significant implications from an analysis of these data for the classroom teacher is the discrepancy that exists among some children between high potential in terms of possessing a creative temperament and the display of low performance on a test supposedly designed to tap creative thinking. If this discrepancy does occur, as it did in this study, the teacher should seriously consider the kinds of opportunities, or lack of opportunities, creative children are given in the classroom for releasing or developing their full creative potential.

Needless to say, much remains to be studied in the field of creativity. Including its relationship to both intellectual and personality factors. Presently, what is termed "creativity" includes various behaviors comprised of different factors. Until research further delineates creativity, no single test may be used to exhaustively measure creativity.

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APPENDIX C

SAMPLE IDEAS BOOK

CLASSROOM

I D E A S

FOR DEVELOPING
PRODUCTIVE-DIVERGENT
THINKING

Submitted by Partially Trained Teachers of the
National Schools Project located at:

Oak Grove School - Medford, Oregon
Hill Field School - Clearfield, Utah
LeClaire School - Edwardsville, Illinois
Hutchinson Elementary - Hutchinson, Minnesota
Saint Leo's Parochial School - Saint Paul, Minnesota
Mill Middle School - Williamsville, New York

Frank E. Williams, Ph.D.
Director, National Schools Project

Assisted by:

Berenice Bleedorn
Mary Jane Robinett

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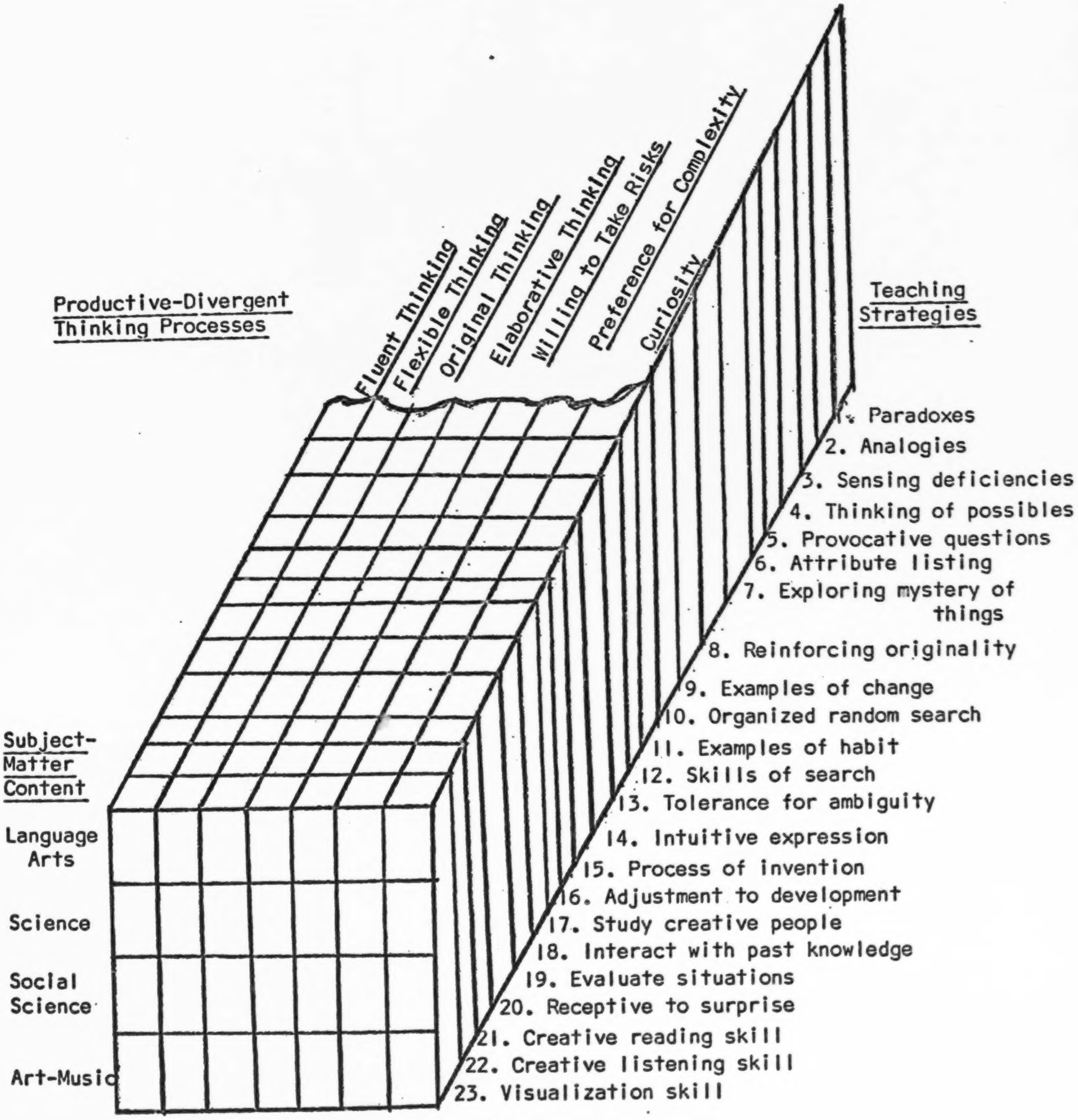
THINKING PROCESSES

NAME	MEANING
FLUENT THINKING	Generation of a quantity Who thinks of the most ideas Flow of thought Number of relevant responses Ability to produce the most in a given time
FLEXIBLE THINKING	Number of different approaches Variety of kinds of ideas Ability to shift categories Versatility to change in focus Detours in direction of thought
ORIGINAL THINKING	Unusual responses Clever ideas Novel but relevant approaches Production away from the obvious Infrequent thought within the group or from one's own repertoire of responses
ELABORATIVE THINKING	Embellishing upon an idea Add necessary details to work out a new thought Production of detailed steps Embroider upon a simple idea or response to make it more elegant Sketch or expand upon things or ideas
WILLINGNESS TO TAKE RISKS	Sets greater goals for greater gains Trys out adventurous tasks Ventures to guess Enjoys activities involving chance
PREFERENCE FOR COMPLEXITY	Ability to handle involved details Likes to toy with intricate ideas Can cope with knotty solutions or problems Challenged by complications "Digs into" difficult problems or solutions
CURIOSITY	Thrives on novel routes or choices Exploratory behavior directed toward acquiring information Examines things and ideas Preference for the unknown or the unfamiliar Capacity to wonder about things which may lead somewhere


Productive-Divergent Thinking Processes
Fluent Thinking
Flexible Thinking
Original Thinking
Elaborative Thinking
Willing to Take Risks
Preference for Complexity
Curiosity
Teaching Strategies
1. Paradoxes
2. Analogies
3. Sensing deficiencies
4. Thinking of possibles
5. Provocative questions
6. Attribute listing
7. Exploring mystery of things
8. Reinforcing originality
9. Examples of change
10. Organized random search
11. Examples of habit
12. Skills of search
13. Tolerance for ambiguity
14. Intuitive expression
15. Process of invention
16. Adjustment to development
17. Study creative people
18. Interact with past knowledge
19. Evaluate situations
20. Receptive to surprise
21. Creative reading skill
22. Creative listening skill
23. Visualization skill
Subject-Matter Content
Language Arts
Science
Social Science
Art-Music

MODEL FOR THE TEACHING OF PRODUCTIVE-DIVERGENT THINKING THROUGH SUBJECT-MATTER CONTENT

INTRODUCTION AND INSTRUCTIONS FOR USE OF THE BOOK

This is an experimental-pilot workbook in its developmental stage. There have been numerous idea books produced for teachers, but none have attempted to program classroom learning experiences for a direct attack upon the development of thinking. I recognize that there are a multitude of thinking processes which pupils are capable of producing but the National Schools Project is purposely delimited to those which contribute to creativity. Therefore, the ideas contained herein are all classified across a schema which deals primarily with the production of divergent thinking since this is an area which recent research on mental activity indicates is most promising for attempts to develop creativity.

May I invite you to use this book as a launching pad for continuing to search for new ideas to add, or to develop variations by modifying those ideas contained within this preliminary collection. This book is a product which has grown out of the cooperation of trained teachers of the first three schools of the National Schools Project. This project consists of complete staffs of certain selected elementary schools throughout the country seeking ways to develop creative potential among young children.

The purpose of this first working-model idea book is clearly that of assisting the elementary school teacher in doing a more effective job for directly promoting the growth of productive-divergent thinking processes which contribute to creativity across the subject-matter curriculum. All of the ideas in this collection are teacher-tested and were contributed by those very innovative and generous teachers from our first three project schools. I have taken many liberties with their ideas in order to classify them across the project model. I took these liberties so that each idea is designed to focus upon the development of a thinking process across a subject area by the use of specific teaching strategies.

There are three sections to this book marked by colored tabular dividers with corresponding color pages indicating grade level. These color-coded sections are as follows:

COLOR CODING

The YELLOW section contains ideas for primary grade classroom teachers; kindergarten through second grade.
The PINK section contains ideas for middle grade classroom teachers; third and fourth.
The BLUE section contains ideas for upper grade classroom teachers; fifth and sixth.

The format of each idea presented is as follows: (See Idea 21, page 12 for example.)

IDEA FORMAT

To Develop: Flexible Thinking
Through: Social Studies
Using: Strategies -
No. 4, Thinking of possibles
No. 6, Attribute listing

There are two fold-out pages at the very front and back of the book. Both of these pages are to conveniently assist the teacher in defining those thinking processes and teaching strategies which comprise the two dimensions of the National Schools Project model. The front fold-out page lists and states several meanings for those seven mental abilities which can facilitate pupils to think creatively. The back fold-out page lists and states the meaning of those twenty-three teaching strategies which can be used in classrooms to guide pupils through subject-matter content toward the development of thinking creatively. The emphasis and primary objective of every idea is to expand upon or unfold thinking potential. The project model is also shown on each of these fold-out pages for easy reference.

FOLD-OUT PAGES

For example, Idea 21 on page 12 indicates it is an idea which can be used by the teacher to promote Flexible Thinking. The subject content of the idea is Social Studies. The strategies which the idea employs are allowing the pupil to think of possibilities (Strategy No. 4) and to list attributes (Strategy No. 6). The meaning of the thinking process of Flexibility can be verified on the front fold-out page, and the meanings of teaching strategies No. 4, Thinking of possibles, and No. 6, Attribute listing, can be easily referred to on the back fold-out page.

Each idea statement contains an underlined cue which triggers the particular thinking process that the idea is intended to develop.

CUES

An example again is Idea 21 on page 12. This idea contains an underlined statement as follows: "name as many types of writing surfaces as you can . . . . ". This is a cue for calling forth a number of different approaches or a variety of kinds of responses which is a direction to pupils to think flexibly.

Immediately proceeding the idea pages of each color-coded grade level section are seven index pages; one for each of the thinking processes; i.e., Fluent Thinking, Flexible Thinking, etc.; each labeled accordingly.

INDEX PAGES

As an example, Idea 21 on page 12 is indexed in the YELLOW section on the index page labeled; To Develop:

Flexible Thinking. This is how this primary grade idea was classified according to its ability and cue to develop the process of Flexible Thinking. Going down the Social Studies column to the No. 4 and No. 6 teaching strategies you will find Idea No. 21 indexed followed by its page number in parentheses (12).

INDEX PAGES

These index pages are useful for showing teachers what ideas are available in the book using a certain teaching strategy through a subject in order to develop a specific thinking process. Thus, if a middle grade teacher (fourth grade) wants to use teaching strategy No. 5 (Asking provocative questions) through science to develop Fluent Thinking, he or she would turn to the PINK index page labeled "To Develop: Fluent Thinking"; go down the vertical column marked "Science" to the horizontal column of strategy No. 5 and find Idea 2 (on page 32) and Idea 3 (on page 33). Turning to these idea numbers (Idea No. 2 or 3) on their respective pages (pages 32 or 33), the teacher would find each idea is classified to develop Fluent Thinking as well as Curiosity. Then both ideas are also cross-indexed on the "To Develop: Curiosity" index page as well. Other teaching strategies may also be indicated if the idea employs more than one style of teaching. These two ideas are likewise cross-indexed under teaching strategy No. 7 (Exploring mystery of things) and No. 12 (Skills of search) respectively. In this manner, all of the ideas in the book are cross-indexed for the teachers' convenient reference.

INNOVATION REPORT FORMS

Following each color-coded grade level section of ideas you will find a collection of white "Innovation Report Form" pages for your use in writing up other ideas which have been generated out of the collection in this book. Or, in the event you use one of the ideas in a different way, please report it on these pages.

You will note there is abundant space left available on each idea page for your comments or suggestions. Please do not hesitate to jot down your ideas here if more convenient.

I would welcome your further ideas, casual statements and particularly new ideas which may come about as you use and work with this book. Only in this way will a continual cross-feed of information and a sharing of ideas for teaching creative thinking come about and we can then see how "Operation Snowball" is'snowballing'.

Macalester College
December, 1966

Frank E. Williams
Director

TO DEVELOP: FLUENT THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					
3	10(6)		10(6)		
4	10(6)		10(6)		
5					
6		70(31I)			
7					
8					
9					
10	10(6)	73(31J)	10(6)		
11					
12		70(31I), 73(31J)			
13					
14					
15					
16					
17			22(13)		
18		73(31J)	22(13)		
19		70(31I)	22(13)		
20					
21					
22					
23					

TO DEVELOP: FLEXIBLE THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2	65(31F)			65(31F)	
3	14(9),65(31F)			65(31F)	
4			21(12)		
5		35(20)			
6			21(12)		
7					
8					
9					
10	14(9)			71(31I)	71(31I)
11					
12					
13					
14			20(12)	20(12), 47(27), 71(31I)	71(31I)
15					
16					
17			22(13)		
18	65(31F)	35(20)	20(12), 22(13)	20(12), 65(31F) 71(31I)	71(31I)
19	65(31F)		22(13)	65(31F)	
20					
21					
22				47(27)	
23					

TO DEVELOP: ORIGINAL THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2		46(27)			
3			72(31J)		
4	15(9)	46(27)			
5					
6					
7					
8		46(27)			
9					
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11					
12					
13			72(31J)		
14					
15			72(31J)		
16					
17					
18					
19	15(9)				
20					
21					
22					
23		46(27)			

TO DEVELOP: ELABORATIVE THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2		46(27)			
3					
4	23(13),64(31E)	46(27)		23(13)	
5					
6					
7					
8		46(27)			
9					
10	64(31E)				
11					
12					
13					
14	23(13)			23(13)	
15					
16	63(31E)				
17					
18					
19	63(31E),64(31E)				
20					
21					
22	63(31E)				
23	23(13)	46(27)		23(13)	

TO DEVELOP: WILLINGNESS TO TAKE RISKS

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					
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5					
6		70(311)			
7					
8					
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11					
12		70(311)			
13					
14					
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16					
17					
18					
19		70(311)			
20					
21					
22					
23					

TO DEVELOP: PREFERENCE FOR COMPLEXITY

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					
3			72(31J)		
4					
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11					
12					
13			72(31J)		
14					
15			72(31J)		
16	63(31E)				
17					
18					
19	63(31E)				
20					
21					
22	63(31E)				
23					

TO DEVELOP: CURIOSITY

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2	65(31F)			65(31F)	
3	65(31F)			65(31F)	
4	23(13)			23(13)	
5		35(20)			
6					
7					
8					
9					
10					
11					
12					
13					
14	23(13)		20(12)	20(12), 23(13)	
15					
16					
17					
18	65(31F)	35(20)	20(12)	20(12), 65(31F)	
19	65(31F)			65(31F)	
20					
21					
22					
23	23(13)			23(13)	

Idea No. 10

To Develop: Fluency

Through: Language Arts; Social Studies

Using: Strategies
No. 3 - Sensing deficiencies
No. 4 - Thinking of possibles
No. 10 - Organized-random search

The class was preparing to take a field trip to Grant's Farm in St. Louis. The trip would be an hour's ride from the school, and the teacher told the children to be aware of and to enjoy the lovely natural panorama they would be passing. To test expressional fluency the teacher asked the children to use the following skeleton, having each word begin with the letter indicated, and write as many sentences as they could about what they anticipated seeing on their excursion.

B____ a____ g____ w____ t____ t____ f____.

W____ s____ t____ a____.

Children produced:
"Boys and girls went to the farm."
"Birds and goats were trying to fight".
"We saw the arch".
"We spoke to animals."

This language arts form may be used both as a developmental and culminating activity. After familiarization with the form, children often construct their own patterns. Children were given opportunities to provide variable missing elements as they thought in terms of possibilities and alternatives.

Idea No. 14

To Develop: Flexibility

Through: Language Arts

Using: Strategies
No. 3 - Sensing deficiencies
No. 10 - Organized-random search

This exercise was used by a second grade teacher at Christmas time. The teacher asked the children to rearrange the letters in these scrambled words to make a new word associated with Christmas:

reet..........(tree)
srat..........(star)
oyllh.........(holly)
ifgt..........(gift)
owsn..........(snow)

This is an excellent technique for fostering flexibility in the thinking patterns of students by involving the children in a search for missing elements. A continuation of this lesson could be: The following scrambled words remind one of winter. Discover what the words are by filling in the missing letters:

i - e (ice)
sl -- t (sleet)
co - d (cold)
fr -- ze (freeze)
sl - de (slide)
c - at (coat)

- -

Idea No 15

To Develop: Originality

Through: Language Arts

Using: Strategies
No. 4 - Thinking of possibles
No. 19 - Evaluate consequences-implications

The story, "The Fox and the Goat" was shared with a second grade class: A fox who was on the prowl for food became very thirsty. He passed by an open well and seeing the cool water, he jumped into the well to get a drink. A goat passing by heard the fox calling for help and he jumped in also. Then the two wondered how to get out.

The teacher left the story unfinished and asked the children to suggest unusual ways in which the animals might get out of their predicament. Ideas offered were: use a rope; use the holes between the bricks for steps; use a boat; get in the bucket; take the plug out--water will drain; use rocks on the edge; get a fire engine-pump water into the well until they float out; call for help; get a helicopter to lower a rope; when someone came for water, he would assist them.

Idea No. 20

To Develop: Curiosity; Flexibility

Through: Social Studies; Music

Using: Strategies
No. 14 - Intuitive expression
No. 18 - Interact with past knowledge

While engaged in a study of Children of Other Lands, the children concentrated particularly on the daily living of Mexican, Japanese, and Norwegian children. The teacher asked the class to pretend that they were 7 year old Mexican children and to describe various aspects of their daily activities. The class discussed:

- Food
- Schools
- Recreation
- Religion

During this 2 day discussion the class composed several Mexican songs and games, which allowed them to think bilingually as well as to concentrate on the selection of dance steps appropriate to Mexican melodies. As the group realized the relationship between socio-economic groups and life activities, they began to think intuitively regarding situations in which some Mexican children might wish for the opportunity to visit or be a part of other cultures.

Idea No. 21

To Develop: Flexibility

Through: Social Studies

Using: Strategies
No. 4 - Thinking of possibles
No. 6 - Attribute listing

As part of a "Children of Other Lands" unit, the children had examined Japanese stationery and had discussed the scarcity and high cost of paper in Japan. The teacher asked each class member to: "pretend that your family is so poor they cannot afford to pay a high price for paper and to name as many types of writing surfaces as you can and tell where you would find these or how you could make them." During the school year the class had been exposed to concepts of supply and demand, scarcity and cost, etc., and this activity has served as an illustration of these principles. Also the teacher wanted the children to realize that objects can be utilized or can function in many different ways. She hoped that the children would invent numerous ways of changing common objects so that they might be adapted to the writing process.

Idea No. 22

To Develop: Fluency; Flexibility

Through: Social Studies

Using: Strategies
No. 17 - Study creative people
No. 18 - Interact with past knowledge
No. 19 - Evaluate consequences-implications

The teacher asked, "Will you pretend that tomorrow a rocket ship will land on the playground, and after a few hours it will take off for a new planet. Imagine that you are responsible for selecting 100 persons who will board the ship and blast off to build a new world. Because only 100 persons will be allowed to go, you must very carefully decide as many different ways as you can for selecting the most valuable people. When you make your suggestions, also give the reason for your choice."

The activity was used near the first of the year in order to determine the class's concept of American society. The teacher was also attempting determination of ideational and utilitarian fluency. Even though the dominant technique here was brainstorming, the teacher was concerned with more than mere recall of material. Her intention was to encourage the children also to interact with past knowledge. She wanted to determine the class concept of "relative-occupational importance", and she wanted the children to realize the value of social interdependence.

Idea No. 23

To Develop: Curiosity; Elaboration

Through: Art; Language Arts

Using: Strategies
No. 4 - Thinking of possibles
No. 14 - Intuitive expression
No. 23 - Visualization skill

In the social studies class a story was read about a little girl who vacationed on her grandmother's farm and returned home by air. The teacher asked the class to pretend that they were Sally and add to the story by telling what things they would be thinking about as they flew through the air. After some of their ideas were dramatized and the dramatizations evaluated, the teacher asked the children to draw pictures showing what grandmother might be doing now that Sally had gone.

Idea No. 35

To Develop: Curiosity; Flexibility

Through: Science

Using: Strategies
No. 5 - Poovocative questions
No. 18 - Interact with past knowledge

In a science lesson on evaporation, the class learned the causes of evaporation, the causes of rainfall, etc. The children observed filmstrips, conducted experiments, etc. Finally the teacher asked, "Would you rather be a raindrop or a kite? Why?" Such a provocative question allowed for flexibility of thought, and also served as a review activity for the water unit. Ideas and supporting statements included:

A. A rain drop
  Because I would never die
  I would keep coming back
  I could disappear
  I could go up in the clouds
  I might take a long journey down a river to the ocean
  I would be very important because people would need me
  I would make things clean

B. A kite
  Because I could fly
  Being torn by the wind would not be as painful as it would be to have a person drink you

Idea No. 46

To Develop: Originality; Elaboration

Through: Science

Using: Strategies
No. 2 - Analogies
No. 4 - Thinking of possibles
No. 8 - Reinforcing originality
No. 23 - Visualization skill

My class had just finished reading a story, about a boy who had invented a vacuum cleaner to do a job he did not like. I thought this "story situation" excellent for creative thinking. I asked the class, "Could you draw a picture of a machine that would do a job you do not like to do? This can be a machine you have invented (one you have never seen before) or an actual machine which you know about and could be used to do the job you do not like. After you have drawn the machine, you may tell the boys and girls what job you do not like to do and how the machine works to do this job for you. Think a while before you start to design a different kind of machine of how you could use an existing machine in a new way to do the job for you.'

Idea No. 47

To Develop: Flexibility

Through: Music

Using: Strategies
No. 14 - Intuitive expression
No. 22 - Creative listening skill

This is an activity that will help children build a readiness background for musical rhythms (rhythm band instruments, time, etc.) They will learn to be better listeners. It will also help to train the ear for differences and likenesses in sound as a reading readiness aid. Children were taught to listen for different rhythms in the environment about them. They clapped their names, the place they live, the street they live on, calendar months, days of the week, the way a ball bounces, etc. In this way they learned to appreciate different kinds of rhythms that exist in the sounds about them and grew in confidence and ability to try to identify sounds.

Idea No. 48

To Develop: Originality; Willingness to take risks

Through: Language Arts

Using: Strategies
No. 6 - Attribute listing
No. 8 - Reinforcing originality
No. 14 - Intuitive expression

Have children shut their eyes and concentrate on the feeling of sharpness; then imagine how a sharp object would feel against their hand. Do the same with other sensations, such as heat, wetness, roughness, etc. Have them think of some way to describe something that would produce this feeling and use it in a riddle. Have them write the riddle and take turns reading them to the class for the children to guess. As the children became enthusiastic about their riddles ask them to try to find unique things to describe in riddle form. Tell them to think of something that no one would think of so there would be no duplications. This really helped them to learn to be original.

Idea No. 49

To Develop: Curiosity; Willingness to take risks

Through: Art

Using: Strategies
No. 4 - Thinking of possibles
No. 5 - Provocative questions
No. 23 - Visualization skill

Here is a way to find out what questions a child has in mind about a specific subject. The children were asked to visualize and illustrate a question that they might have about some school subject. As the children show their individual illustrated questions the rest of the class guesses what question is being asked. This could be an aid to the teacher in understanding individual questions the children have. There also could be a question box placed in the room for puzzling questions expressed by use of a picture.

Idea No. 63

To Develop: Elaboration, Preference for Complexity

Through: Language Arts

Using: Strategies
No. 16 - Adjustment to Development
No. 19 - Evaluate Situations
No. 22 - Creative Listening Skill

The class listened to two stories several days apart - The Little Bear Who Didn't Want to Learn to Read and Mr. Pine's Mixed-up Signs. They thought about the detailed things that happened as a result of the mix-ups. (I wanted to impress them with the importance of reading.) The children were then asked to draw pictures or cartoons of their own that would show some mix-up that might happen because of wrong signs or reading a sign wrong and to elaborate upon such details.

- -

Idea No. 64

To Develop: Elaboration

Through: Language Arts

Using: Strategies
No. 4 - Thinking of possibles
No. 10 - Organized random search
No. 19 - Evaluate situations

The class listened to the following story, "The Picnic" (Peabody Language Development Kit, Level 2, Lesson 4).

The Picnic

Mrs. Anderson smiled to herself as she was preparing breakfast for her family. She had an exciting idea. The sun was shining and it was going to be a beautiful day. She would fill a basket with fried chicken, crisp red apples, sandwiches, carrot sticks, and iced lemonade. Then she would ask the family to go on a picnic. Mr Anderson, Alice, and Timmy thought going on a picnic was a wonderful idea. Even Johnny, the baby, laughed and cooed as they hopped into the car. Timmy said excitedly, "Let's stop at Grandma's house and invite her and Grandfather to go along." As they came to the edge of town, Mr. Anderson heard a knock in the car engine. He looked puzzled. The car slowed down and came to a chugging stop, right on the railroad tracks. All at once Alice looked and screamed in a very loud and frightened voice, "Daddy! Daddy! Here comes a train!"

Continued on next page.

Idea No. 64 continued from page 31E.

The children divided into groups and were asked to go on from where the story left off and finish telling everything they could think of that would make a good ending to the story, and offer a solution to the problem. Different groups thought of details in different ways such as:

The family jumped out of the car, but the car was hit
The engineer saw the car and stopped
The family jumped from the car - saw the switch near the track - hurried and switched the train to another track - got back into the car and continued their picnic.

This was the first experience for these children to be all on their own in groups. The ideas really flew!

- -

Idea No. 65

To Develop: Curiosity, Flexibility

Through: Language Arts, Art

Using: Strategies
No. 2 - Analogies
No. 3 - Sensing Deficiencies
No. 18 - Interact With Past Knowledge
No. 19 - Evaluate Situations

The children were asked to imagine they were someone or something different and explore how they would see the world in this new way...maybe as a giant, or a little bug, or a trapeze artist, or a Martian...We discussed each one in terms of "where would you live?" "How would things about you look from this different perspective?" This was followed by each choosing one thing they wanted to imagine about and choosing the medium they wished to use for an art project about their imagining. Some children who hadn't been very excited over the discussion came through with very unusual ideas in art expression.

Idea No. 70

To Develop: Fluency, Willingness to Take Risks

Through: Science

Using: Strategies
No. 6 - Attribute Listing
No. 12 - Skills of Search
No. 19 - Evaluate Situations

The class had been talking about magnets and hypothesizing about what they can and cannot do. The teacher said, "Let's try to think of as many things as we can to test so we can find out if they are attracted to magnets." We set out a box for YES items and a box for NO items. After two or three weeks of free experimentation, we compiled a list of items that are and a list of items that are not attracted to magnets with some guesses of why each item belonged to one or the other lists. These were then tested and their guesses verified. The children began to realize the similarities between the items on each list and discovered the inherent properties of things that are or are not attracted to magnets. This gave each one a chance to guess, to test, and to record the results.

Idea No. 71

To Develop: Flexibility

Through: Arithmetic, Art

Using: Strategies
No. 10 - Organized Random Search
No. 14 - Intuitive Expression
No. 18 - Interact with Past Knowledge

The teacher asked the question: What is "2"? What comes to your mind when I say "two" or when you see the numeral "2"? Then she said, " "Let's see how many different kinds of things you can make or in how many different kinds of ways you can show what you think of for "2"." It was gratifying to have these children who were slow thingers, immature students, poor listeners produce a variety of concepts about "2" and to be exposed to each other's concepts; expressed in many kinds of ways through the use of crayons, construction paper, scissors, paste such as:

pair of mittens
2 apples
1 + 1 = 2
4 - 2 = 2
cart with 2 wheels
birthday cake with 2 candles

Continued on next page

Idea No. 71 continued

2 boys
2 wagons
2 bottles of milk

All projects were displayed on a bulletin board.

Idea No. 72

To Develop: Preference for Complexity, Originality

Through: Social Studies

Using: Strategies
No. 3 - Sensing Deficiencies
No. 13 - Tolerance for Ambiguity
No. 15 - Process of Invention

To introduce the study of transportation the class was asked to imagine they were "marooned" on a large desert island without any supplies of any type. The problem was to design a new means of transportation to get off the island. Various transportation devices were invented by the children. They had to start from scratch with their own ideas.

Idea No. 73

To Develop: Fluency

Through: Science

Using: Strategies
No.10 - Organized Random Search
No. 12 - Skills of Search
No. 18 - Interact with Past Knowledge

The class had been discussing the bones of the body. As a class activity the teacher asked them to take a chance and guess all the ways they could think of that their bones were important to them. The children's lists were shown on the overhead projector so their ideas could be compared. The next step was to search and find if their concepts are right or wrong. After all research has been completed, they will be asked to write a second paper on the skeleton. In this way we will make comparisons between hypothesized knowledge and verifiable knowledge.

INNOVATION REPORT FORM

School ______________________ Grade-level ______________________

A. - THIS IS HOW I USED IDEA NO._____ON PAGE _____.

B. - MATERIALS USED: (Films, books, etc.)

C. - RESULTS (This is what happened)

D. - MODEL CLASSIFICATION: (optional)

To Develop: Thinking Process(es)	Through: Subject Area	Using: Teaching Strategy(ies)

- -

A. - THIS IS A NEW IDEA I SHOULD LIKE TO REPORT

B. - MATERIALS USED: (Films, books, etc.)

C. - RESULTS - (This is what happened)

D. - MODEL CLASSIFICATION (optional)

To Develop: Thinking Process(es)	Through: Subject Area	Using: Teaching Strategy(ies)

TO DEVELOP: FLUENT THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					
3					
4		54(56D)			
5		2(32)	33(49)		
6					
7		2(32), 54(56D)			
8					
9					
10		54(56D)			
11					
12			33(49)		
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16					
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18					
19			33(49)		
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23					

TO DEVELOP: FLEXIBLE THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2	28(47)				
3					
4	20(42), 56(56E)		55(56D)	38(52)	
5			55(56D)		
6	28(47)				
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9			55(56D)		
10	28(47), 56(56E)				
11					
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13				38(52)	
14				9(36)	
15					
16					
17	20(42)				
18					
19	56(56E)				
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21					
22				9(36)	
23					

TO DEVELOP: ORIGINAL THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					---
2	28(47)				
3					
4					
5					
6	28(47)				
7					
8	64(561)			64(561)	
9					
10	28(47), 64(561)	1(32)	6(34)	10(36), 64(561)	
11					
12					
13			29(47)		
14					
15					
16					
17					
18		1(32)	29(47)		
19					
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21					
22					
23	64(561)			10(36), 64(561)	

TO DEVELOP: ELABORATIVE THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					
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9			48(56A)		
10	39(52)				
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14				9(36), 25(45)	
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18			48(56A)		
19					
20					
21	39(52)				
22				9(36), 25(45)	
23					

TO DEVELOP: WILLINGNESS TO TAKE RISKS

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
STRATEGIES: No. 1					
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4	57(56E)			38(52)	
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7					
8					
9	57(56E)				
10					
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12					
13				38(52)	
14					
15					
16					
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18					
19	57(56E)				
20	57(56E)				
21					
22					
23					

TO DEVELOP: PREFERENCE FOR COMPLEXITY

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					
3	65(561)				
4					
5	49(56A), 65(561)			49(56A)	
6					
7					
8					
9					
10		1(32)			
11					
12					
13			29(47)		
14	49(56A)			49(56A)	
15					
16					
17					
18		1(32)	29(47)		
19	65(561)				
20					
21					
22					
23	49(56A)			49(56A)	

TO DEVELOP: CURIOSITY

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2					5(34)
3					
4		7(35)	55(56D)		
5	49(56A)	2(32)	8(35),24(45), 33(49),55(56D)	49(56A)	
6					
7	32(49)	2(32)		32(49)	
8					
9			55(56D)		
10					
11					
12		7(35)	8(35),24(45), 33(49)		
13					
14	49(56A)	7(35)		49(56A)	
15					
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18			8(35)		
19			33(49)		
20					
21					
22					
23	49(56A)			49(56A)	

Idea No. 1

To Develop: Originality; Preference for complexity

Through: Science

Using: Strategies
No. 10 - Organized-random search
No. 18 - Interact with past knowledge

The teacher asked the class to design an imaginary country in which they would locate areas of the 5 major geographical types: deserts, plains, mountainous areas, etc. In order to accomplish this it was suggested that they recall the major land forms in the U.S. for their departure point. After these areas were laid out, they were asked to construct a climate guide for their map, which in outline form would explain the type of climate generally found with each land-form area. Next, they were asked to dr name, and characterize ten imaginary animals and to locate thes on the proper terrain sections. In order to create these animals the children must understand the physical characteristics of specific animals that allow them to adapt themselves to different environments. Finally, they were asked to remove a single animal from its natural habitat and to tell how it, through the aid of man or by itself, might become adapted to life in a new environment.

Idea No. 2

To Develop: Curiosity; Fluency

Through: Science (Health)

Using: Strategies
No. 5 - Provocative questions
No. 7 - Exploring mystery of things

A third grade unit on health, "The Study of the Human Body" was introduced with the question, "What are some things we do not know about the human body?" For five minutes the class was permitted to list all of the things they were curious to learn.
Some examples: How do the different parts of the body work?
Why do we have unlike bodies?
How does the heart pump blood?
How were we made?
Does hair have bones?
Why isn't the heart located in the head?
From this sampling the teacher could chart her course. One can readily see how individual interests would prevail and determin the depth to which the child might explore each question. Ther is also an opportunity here for majority rule to determine what areas the class sould explore, while at the same time freedom was permitted for individuals to pursue their own interests.

Idea No. 5

To Develop: Curiosity

Through: Arithmetic

Using: Strategies
No. 2 - Analogies

The objective of this lesson (introducing fractions) was to allow an opportunity for children to explore rythm patterns in music leading them to an understanding of fractions in arithmetic. The teacher selected records, any of John Phillip Sousa's Marches and one of the Emperor Waltzes by Strauss, to play for the children. These two selections are excellent in helping point out the 4 - 4(1/4)count of march time and the 1-2-3 (1/3) count of waltz time. The idea was stressed that rhythm is a division of notes or that a note is a part of a measure of music just as a fraction is a division of a whole and the fractional part is one segment of this whole.

Idea No. 6

To Develop: Originality

Through: Social Studies

Using: Strategies
No. 10 - Organized-random search

To fulfill the requirement of designing a Social Studies booklet cover, the children created composite pictures. Old magazines, scissors, and glue were provided, and the children began their search for small, colorful objects that pertained to the economical, recreational, political, etc., phases of life in their state of Illinois. One child sketched and duplicated a physical outline of the State and the children overlaid and pasted into place their photographs.

Idea No. 7

To Develop: Curiosity

Through: Science

Using: Strategies
No. 4 - Thinking of possibles
No. 12 - Skills of search
No. 14 - Intuitive expression

The teacher's aim was to have children explore the effects of sight and smell on the taste of foods. She divided children into groups and each wore a blindfold as he tasted various raw and cooked foods. It was discovered that raw foods are more easily identified by taste and texture than are cooked ones. The class attributed this condition to the fact that texture, flavor, etc., may be altered in cooking. The class also felt that extensively cooked foods could appear less tasty because of their musiness. They concluded that while sight and smell are not as important in the identification of raw foods as they are to the discrimination of cooked ones, the use of both senses adds considerably to the enjoyment of all foods. They did set up the hypotheses that sight and smell are essential to the enjoyment of eating, and as they tested this supposition they were able to discover other associated conditions.

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Idea No. 8

To Develop: Curiosity

Through: Social Studies

Using: Strategies
No. 5 - Provocative questions
No. 12 - Skills of search
No. 18 - Interact with past knowledge

After a thorough study of colonization, trade, exploration, etc., patterns in the late 17th and early 18th centuries in the United States; the class was presented with an outline map of North America on which the major river system had been altered so as to run from east to west - from the Great Lakes to Los Angeles. Question: What if the Mississippi River had run from east to west as depicted on the map? Would it have altered the manner, rate, and period in which our country was settled and developed? The class became involved in the process of historical search as they formulated and tested hypotheses and considered possibilities and alternatives. A few final conclusions included:

1. Due to the mountain range, re-positioning the eastern coast would become desert area.
2. Explorers could possibly have sailed through North America and continued without stopping for settlement.

Idea No. 8 continued:

3. The biggest cities would have appeared around the Grea Lakes.
4. Pioneers would have reached the West sooner.
5. States would be shaped differently.
6. The Union of States would probably never have been formed.

Idea No. 9

To Develop: Flexibility; Elaboration

Through: Music

Using: Strategies
No. 14 - Intuitive expression
No. 22 - Creative listening skill

Working single or in pairs, children improvised various kinds o dance steps which were appropriate for various rhythmic themes played on a phonograph record: Evans, Ruth: Rhythmic Activities in Lower Grades, Series V. The record included melodies of a wide variety of moods, etc., and so dance patterns had to be shifted frequently. The teacher observed little imitatio The children were anxious to repeat the activity in order that they might be able to elaborate upon their established basic pattern.

Idea No. 10

To Develop: Originality

Through: Art

Using: Strategies
No. 10 - Organized-random search
No. 23 - Visualization skill

In a fourth grade class each child was handed a piece of 9" x 1 drawing paper on which the teacher had drawn five curved lines of various lengths and different degrees of curves. This technique followed a discussion during an art lesson in which the class talked about "things that looked like other things", for example - "pictures" that are made by clouds or shadows. After a ten minute discussion the following directions were given: See what a different and exciting picture you can make using these five lines by adding other lines and details. Experiment with them, and after you have completed the picture, give it a title. Try to think of a title that will be unique, or that no one else would be likely to think of.

Idea No. 20

To Develop: Flexibility

Through: Language Arts

Using: Strategies
No. 4 - Thinking of possibles
No. 17 - Study creative people

This technique was used by a fourth grade teacher who was about to introduce a reading unit which involved fairy tales. Without identifying the character, a short biographical sketch of Hans C. Anderson's early life was read to the children. The teacher stopped the story and gave these directions: Tell in a paragraph or two all of the different things that might have happened to this poor young boy. A variety of ideas was submitted:

1. The boy wandered around for some time and was rejected by society. Then one kind old man offered him food and lodging. The boy was very happy. Just before the old gentleman died he revealed to the boy a magic mirror which showed him to be a handsome lad. The boy returned to his home and mother to live happily ever after.

2. The boy, not accepted by society, wandered about until he became a circus clown. Life was very happy from then on.

3. Immediately upon leaving home the boy became an apprentice to a famous artist. The precocious young lad produced many widely acclaimed art pieces, the most famous of which was a realistic portrait of a very wealthy king. At the age of seventy-five he died and his paintings are now forgotten.

4. He obtained a position as a publisher, but realizing the need for formal education, he resigned and entered school. After college he was able to finance his private publishing house. His children's stories were so widely accepted that he soon became a millionaire.

After the composition period, the teacher finished reading the story and the character was revealed. The discussion which followed lead to an appreciation and better understanding of traits and characteristics expressed by many creative individuals.

Idea No. 24

To Develop: Curiosity

Through: Social Studies

Using: Strategies
No. 5 - Provocative questions
No. 12 - Skills of search

We made a study of Indians, especially those of our valley. The children searched through books and materials for information about Indians in general that surprised or interested them. These findings were shared with the class informally. The poem, "Indian Children" by Annette Wynn was used. The children posed questions they would like to find answers about local Indians. Most answers were provided by a trip to the museum and by searching reference materials. Reports were written and read to the class. A mural depicting Indian life was developed. Each child chose an Indian name and gave his reason for choosing it. Oral and written conversations grew naturally out of the study. The children showed independence in locating reference materials. They were interested in identifying with the Indians we studied, showed more sympathy for their problems, and more admiration for their skills. Considerable improvement was shown in the thought-provoking questions they asked which led them to further explorations.

Idea No. 25

To Develop: Elaboration

Through: Music

Using: Strategies
No. 14 - Intuitive expression
No. 22 - Creative listening skill

The class listened to the record, "Klapdance". They figured out steps for dancing to the music, trying to suit the steps to the timing and rhythm of the dance. When the class agreed on the suitability of one step, they went on to add other steps until the dance was finished to the class's satisfaction.

Idea No. 28

To Develop: Originality, Flexibility

Through: Language Arts

Using: Strategies
No. 2 - Analogies
No. 6 - Attribute listing
No. 10 - Organized-random search

We discussed likenesses and differences between dolls, dogs, and roses. Each child choose one of the three and wrote an original poem in cinquain form about it.

Note:----A cinquain is poetry in nonmetrical form composed of the following five lines:
1st line -- one noun
2nd line -- two adjectives
3rd line -- three verbs
4th line -- four words, including several parts of speech
5th line -- one noun which is analogous to the single noun of line one. (synonym)

Idea No. 29

To Develop: Preference for complexity; Originality

Through: Social Studies

Using: Strategies
No. 13 - Tolerance for ambiguity
No. 18 - Interact with past knowledge

I made a game with a map from our Social Studies book for the children to play. Then I suggested they "invent" their own games using maps and try them out on each other. This required dealing with many complex design factors. There was opportunity for much questioning in order that the rules of each game would be clear and concise.

Idea No. 32

To Develop: Curiosity

Through: Language Arts and Art

Using: Strategies
No. 7 - Exploring mystery of things

The teacher showed the class a picture of the "Mary Celeste", the ship that was found floating at sea without its crew. The interest stimulated by the mysterious story was used as an expression. The children were told to explore ways for explaining such a phenomenon at sea and to write an illustrated story about what they thought might have happened.

Idea No. 33

To Develop: Curiosity, Fluency

Through: Social Studies

Using: Strategies
No. 5 - Provocative questions
No. 12 - Skills of search
No. 19 - Evaluate situations

During the study of Western Canada and the gold rush, one boy asked the provocative question, "Why was all exploring done from Europe westward? What if explorers in early times had come from Asia instead of Europe?" This provocative question developed into a class discussion that triggered an exploratory study using books, maps, and library references. Three days of search and discussion followed and many reasons in answer to the question were explored. At the end of the study, the class speculated and developed many ideas about how different the world and our culture might be if early exploration had been done from West to East.

Idea No. 38

To Develop: Willingness to take risks, Flexibility

Through: Art

Using: Strategies
No. 4 - Thinking of possibles
No. 13 - Tolerance for ambiguity

The boys and girls had been asked to use a crayon to do their drawings, but some of them expressed a fear to proceed without using a pencil which could be erased. We had been playing "supposing games", such as "suppose the clock forgot to tick", etc. So we decided to play the "supposing game" with the thought, "Suppose all our pencils were lost today; what would we do?" The children were encouraged to take a chance and try using crayons to write with. This was met with eagerness, as this was a game familiar to them and they thought it fun. Their creative stories, arithmetic, drawings, and everything was done with crayon that day using unlined paper. They found they could change their habits and develop confidence in using a different instrument to write with by thinking through first what they were going to do, since the crayon could not be erased. They made evaluations as to when it was best to use the pencil and when to use the crayons. They found the crayon did produce a freer style when drawing pictures.

Idea No. 39

To Develop: Elaboration

Through: Language Arts

Using: Strategies
No. 10 - Organized-random search
No. 21 - Creative reading skill

Do you have many accumulated papers and pictures? Get all of these together and distribute them at random among the children for planning and organizing into a picture and word study along a particular theme or subject area. Some very interesting and original thoughts can be put together by arranging these articles on art paper and adding on to them as needed. Many stories and new facts come into the children's minds. New interests are introduced and activities involving writing their own ideas and reactions to new ideas develop a creative and a personal involvement. Children are inclined to browse around looking at the work of others; more reading is taking place; self-initiated.

Idea No. 48

To Develop: Elaboration

Through: Social Studies

Using: Strategies
No. 3 - Sensing Deficiencies
No. 9 - Examples of Change
No. 18 - Interact with Past Knowledge

The class was asked to think ahead to the year 2000, to think of how old they will be then, and to try to predict as many changes as they can that will have come about during the thirt-four years. They were asked to discuss in detail how their lives would be affected by changes in food, clothing, automobiles, transportation, etc. Thinking of themselves at the age of forty-three, probably married, and possibly even grandparents gave greater insight to their predictions.

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Idea No. 49

To Develop: Preference for Complexity, Curiosity

Through: Art, Language Arts

Using: Strategies
No. 5 - Provocative Questions
No. 14 - Intuitive Expression
No. 23 - Visualization Skill

The discussion of a story about dogs generated a great deal of examination about them and resulted in some surprising and provocative details beyond the usual consideration of dogs. They explored such questions as: Do dogs have personalities? What kind? If you were a dog, what kind of personality would you have or would you want? What would your name be? Using art supplies the children were asked to visualize and draw the kind of dog they thought they would like to be. They not only gave their dogs expressions, but clothes, money, etc. In some cases there was a resemblance between the dog and the artist (big ears, glasses, etc.)

Idea No. 54

To Develop: Fluency

Through: Science

Using: Strategies
No. 4 - Thinking of Possibles
No. 7 - Exploring Mystery of Things
No. 10 - Organized Random Search

Is the air everywhere? Let's think of as many experiments as we can to prove it is. Pupils did some real thinking. There was no end to the number of experiments they wished to try. Some of these included:

To prove there is air in a glass, place a cork on water. Place inverted glass over it and cork goes to the bottom. Air pushed it down.
Use a box with a hole in it. Squeeze the box and feel the air come out of it.
Place a bottle in water, Bubbles of air escape as water enters.

Idea No. 55

To Develop: Curiosity, Flexibility

Through: Social Studies

Using: Strategies
No. 4 - Thinking of Possibles
No. 5 - Provocative Questions
No. 9 - Examples of Change

How does the time in which we live direct the way in which we live? In our study of Indian homes and way of life each child made a booklet presenting the author as an Indian child telling about his way of life. Field trips, library materials and filmstrips furnished details that helped the "Indian Child" realize the number of different points of view he could explore in obtaining information for his or her book.

Idea No. 56

To Develop: Flexibility

Through: Language Arts

Using: Strategies
No. 4 - Thinking of Possibles
No. 10 - Organized Random Search
No. 19 - Evaluate Situations

We reviewed the journey of the astronauts into space and discussed the news reports on television. We imagined what it would be like to be preparing for a trip to the moon. The teacher asked, "How many different kinds of things can you list that you would choose to put into the pocket of your space suit if you were going to the moon?"* Each child decided how many kinds of things he would wish to take and gave a reason for taking them. Some of the ideas were:

Camera
Food
Pet
Stuffed toy
Flashlight
Mouse
Worm
Book
Blanket made by a great-aunt

* Mauree Applegate's audio tape "In My Space Suit Pocket", Let's Write Radio Series, Wisconsin School of the Air, 1965.

Idea 57

To Develop: Willingness to Take Risks

Through: Language Arts

Using: Strategies
No. 4 - Thinking of Possibles
No. 9 - Examples of Change
No. 19 - Evaluate Situations
No. 20 - Receptive to Surprise

After a recent snowfall we discussed what it would be like if the snow were green instead of white. Children wrote answers to such questions as: What would you do? Would it be prettier? Would it taste better? What would happen? Could this happen? This idea was adapted from Myers and Torrance, "Can You Imagine?", Ginn & Co., 1966. Children were told there would be no "wrong" answers and to use their imagination. Most of the children enjoyed doing this. Some interesting answers especially to "What would you do?" and also "Could this happen?" appeared.

Idea No. 64

To Develop: Originality

Through: Language Arts, Art

Using: Strategies
No. 8 - Reinforcing Originality
No. 10 - Organized Random Search
No. 23 - Visualization Skill

We used the tape, "Elephant's Child". (Mauree Applegate's, "Let's Write" audio tapes, Wisconsin School of the Air, Madison, Wisconsin). The tape was stopped at strategic times in the story to give the children a chance to participate either orally, by drawing a picture, or by writing. The most successful stops were:

Draw an unusual elephant without a nose.
Write a question that has never been asked before about an elephant.
Design and draw a "Trunkless Tree".
Write: Thank of as many ways as you can for how an elephant could use his trunk other than the usual way. What would be the most unusual use?

All children participated with great enthusiasm. The story became important because they were taking an active part and sharing ideas. Imaginations became freer as the story advanced.

Idea No. 65

To Develop: Preference for Complexity

Through: Language Arts

Using: Strategies
No. 3 - Sensing Deficiencies
No. 5 - Provocative Questions
No. 19 - Evaluate Situations

Inadvertently questions are erased from the board after each day even though answers were written by some of the children at their desks. As a means for reviewing yesterday's material we reconstructed questions from recorded answers. So enjoyable was the exercise that we repeated it and then had children study answers which they found in books or had asked the teacher and analyze appropriate questions. This exercise offered an opportunity to discuss the details and constitution of a good question. The children began to realize how important questions are.

INNOVATION REPORT FORM

School ____________________ Grade-level ____________________

A. - THIS IS HOW I USED IDEA NO. ____ ON PAGE ____.

B. - MATERIALS USED: (Films, books, etc.) ____________________

C. - RESULTS (This is what happened) ____________________

D. - MODEL CLASSIFICATION: (optional)

To Develop: Thinking Process(es)	Through: Subject Area	Using: Teaching Strategy(ies)

- -

A. - THIS IS A NEW IDEA I SHOULD LIKE TO REPORT ____________________

B. - MATERIALS USED: (Films, books, etc.) ____________________

C. - RESULTS - (This is what happened) ____________________

D. - MODEL CLASSIFICATION (optional)

To Develop: Thinking Process(es)	Through: Subject Area	Using: Teaching Strategy(ies)

TO DEVELOP: FLUENT THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1.					
2		40(82),			
3			2(57),		
4					46(85),
5			2(57),		
6	30(77)	40(82),	34(79),		
7					
8					
9					
10					46(85),
11					
12					
13					
14		40(82),			
15					
16					
17			34(79),		
18					46(85),
19			34(79),		
20					
21			2(57),		
22					
23					

TO DEVELOP: FLEXIBLE THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
1					
2	15(67),62(85H)		15(67),		
3					
4					45(85),
5	15(67),		15(67),36(80),		
6	30(77),62(85H)		36(80),		
7					
8					
9			50(85B),		
10			50(85B),		
11					
12					
13					
14	62(85H)				
15					
16					
17					
18					
19			36(80),50(85B),		
20					
21					
22					
23					45(85),

TO DEVELOP: ORIGINAL THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
No. 1					
2	62(85H)	40(82)	49(85B)		
3					
4	5(59),6(59)			43(84)	43(84)
5					
6	62(85H)	40(82)			
7					
8	5(59),63(85H)				
9					
10	31(77)				
11					
12					
13					
14	6(59),21(71) 62(85H)63(85H)	40(82)		43(84)	43(84)
15					
16			49(85B)		
17					
18	31(77)		49(85B)		
19	6(59)				
20					
21					
22	63(85H)				
23	21(71),31(77)			43(84)	43(84)

TO DEVELOP: ELABORATIVE THINKING

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES: No.	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
1					
2					
3					
4					
5					
6					
7					
8	63(85H)				
9					
10					
11					
12					
13					
14	63(85H)				
15					
16					
17					
18					
19					
20				44(84),	44(84),
21					
22	63(85H),				
23				44(84),	44(84),

TO DEVELOP: WILLINGNESS TO TAKE RISKS

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES: NO.	IDEA NO. (PAGE NO.)	IDEA NO. (PAGE NO.	IDEA NO. (PAGE NO.)	IDEA NO. (PAGE NO.)	IDEA NO. (PAGE NO.)
1					
2			49(85B)		
3					
4					
5		1(57),			
6					
7		1(57),			
8					
9					
10					
11					
12					
13					
14					
15					
16			49(85B)		
17					
18			49(85B)		
19		1(57),			
20					
21					
22					
23					

TO DEVELOP: PREFERENCE FOR COMPLEXITY

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
NO. 1					
2			14(63)		
3			14(63)		
4			14(63)		46(85),
5			14(63),35(79)		
6			14(63)		
7			14(63)		
8			14(63)		
9			14(63)		
10	31(77)		14(63)		46(85)
11			14(63)		
12					
13					
14			14(63)		
15			14(63)		
16			14(63)		
17			14(63)		
18	31(77),		14(63)		46(85)
19			14(63), 35(79)		
20			35(79)		
21					
22					
23	31(77)		14(63)		

TO DEVELOP: CURIOSITY

THROUGH:	LANGUAGE ARTS	SCIENCE	SOCIAL STUDIES	ART-MUSIC	ARITHMETIC
USING STRATEGIES:	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)	IDEA NO. (page no.)
1			39(82),		
2			14(63),		
3	13(63),	53(85D)	2(57),14(63)	13(63),	
4	13(63)		14(63)	13(63)	
5	13(63),	1(57) 53(85D)	2(57),14(63), 35(79),36(80) 54(85D)	13(63),	
6			14(63),36(80)		
7		1(57), 53(85D)	14(63)		
8			14(63)		
9			14(63),50(85B)		
10			14(63),50(85B)		
11			14(63),		
12					
13					
14	21(71),		14(63)		
15			14(63)		
16			14(63)		
17			14(63)		
18			14(63),39(82)		
19		1(57),	14(63),35(79), 36(80),50(85B) 54(85D)		
20			35(79),39(82)	44(84),	44(84),
21			2(57)		
22					
23	21(71)		14(63),	44(84),	44(84),

Idea No. 1

To Develop: Curiosity; Willingness to take risks

Through: Science

Using: Strategies
No. 5 - Provocative questions
No. 7 - Exploring mystery of things
No. 19 - Evaluate situations

To help children actually participate in a real life experience in connection with their science lessons on the cells of the organisms and their development, it was decided to go through the complete process of incubating and hatching chicken eggs. All of the necessary procedures were discussed and the reasons for doing so were given. Pictures, films, and reports were used. From a study of the development of cells within the egg, it was possible to explore every few days the probable answers to the question: Just what is really happening inside those eggs? The length of time for incubation was explored and based upon this information a date was set for prediction hatching. From the type of eggs incubating, a prediction was also made as to the color and type of chickens to be produced. The chickens hatched at the time predicted. The information that had been gathered during the three weeks was reviewed. Reasons for some of the eggs not hatching were also discussed. Reports were given and all experienced the drama of life unfolding as they watch the chickens emerge from the eggs.

Idea No. 2

To Develop: Curiosity; Fluency

Through: Social Studies

Using: Strategies
No. 3 - Sensing deficiencies
No. 5 - Provocative questions
No. 21 - Creative reading skill

In the study of current events, have each child choose a story in the newspaper that interests him. Ask him to see how many questions he can list that the story causes him to wonder about (additional information needed, reasons why, consequenses of, etc.). Then continue to have each child watch the newspapers for further articles and pictures on then selected event for a week or more to see if he can locate answers to some of his questions. From this a news book can be made and shared with the class. Children learn to explore newspapers and other sources for additional information once they have been allowed to wonder about things.

Idea No. 5

To Develop: Originality

Through: Language Arts

Using: Strategies
No. 4 - Thinking of possibles
No. 8 - Reinforcing originality

After the activity in Idea No. 4 (page 58) the class began an exercise in creative writing. Each student chose one of his illustrations as the inspiration for an unusual and original short story based on an incident involving the particular emotion expressed. Particular approval was given by the teacher to the most unique stories.

Idea No. 6

To Develop: Originality

Through: Language Arts

Using: Strategies
No. 4 - Thinking of possibles
No. 14 - Intuitive expression
No. 19 - Evaluate situations

We used the poem: "Today may be
        sunny, rainy, windy, cloudy.
Something may make you
        laugh, cry, sing, think.
You may feel
        happy, sad, excited, glad.
But whatever happens,
There will never be
Any other day,
Ever again
Just like this day!"

We discussed the uniqueness of days and compared it to the uniqueness of individuals. We decided that there would be only a very rare possibility that any one day or any one individual could ever be just like another. Then each child predicted a day for himself and wrote about it. The prediction included the kind of weather there would be when he got up. Then each one took himself through each of the emotions he might feel during the day and tell what happening might come about during his "suppose day" to bring about this emotion. When the class had finished, each child had a creative story about a possible day in his own life.

Idea No. 13

To Develop: Curiosity

Through: Language Arts; Art

Using: Strategies
No. 3 - Sensing deficiencies
No. 4 - Thinking of possibles
No. 5 - Provocative questions

We put up a picture of a poor but happy man leaning against a door in his chair, strumming a guitar. We wanted to get to know him, and we used our imaginations to inquire about him and his environment. We speculated on possible answers to the following questions:

Who is he? What is he like?
What has happened to him?
What will he do next?

A great deal of interest was evoked and expressed itself in many ways. The children named him--Charlie, Jed, Clem, Clyde; said he'd been through an earthquake--or the bear rug he is sitting on was once the bear that tore his shirt. They drew "before and after" pictures, wrote plays, wrote music, wrote poems, had shows, saw him as a secret spy, or hero of imaginative episodes. Clay scenes were used to show how they thought the inside of his house might look. Many creative responses were developed.

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Idea No. 14

To Develop: Preference for complexity; Curiosity

Through: Social Studies

Using: Strategies
No. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14,
15, 16, 17, 18, 19, 23.

Our study of South America was guided by a series of provocative questions for developing individual research and investigation, requiring a depth of exploration. Some of the questions were:

1. How do you account for the fact that although South America was settled many years before the United States it has not become more advanced?
2. People who live in the Torrid Zone are not always hot. Why?
3. How have earthquakes in South America been blessings in disguise?
4. How can volcanoes do good?
5. The Indians of South America had one of the earliest civilizations; why aren't they more advanced?

Once interest in this lesson was generated by discussing these questions, the teacher used the following variety of teaching strategies to develop further detailed exploration about South America:

(Idea No. 14 continued on next page)

Idea No. 14 continued:

Using Strategy: No. 2, Analogies

1. Compare habits of finches on Galapagos Island with man's tool-making.
2. Compare culture, climate, land forms, etc., of South America with that of the United States.

Using Strategy: No. 3, Sensing deficiencies

1. Why are there no great cities on the top of the Andes Mountains?
2. Since South America was settled earlier, how come it is not more advanced than the United States?

Using Strategy: No. 4, Thinking of possibles

1. What might have happened if the Incas had defeated the Spaniards?
2. What if the English had settled South America instead of the Spaniards?
3. What might have happened if John Glen had lived during the exploration period of South America?

Using Strategy: No. 5, Provocative questions

1. What if you were in charge of a health organization in South America? How would you improve their living conditions?
2. What if the Amazon River did not flow through South America? How would the country be affected?

Using Strategy: No. 6, Attribute listing

1. What else could be done with nitrates?
2. Could anything else be made from cacao?

Using Strategy: No. 7, Exploring mystery of things

1. How were the temples of the Incas built? How could this knowledge be used to advantage today?
2. How were roads built in the mountains without the equipment we have in the United States?
3. How did the Incas learn about astronomy and medicine?

Using Strategy: No. 8, Reinforcing originality

1. Try to get ideas for developing the natural resources of South America that no one else has thought about.
2. Let's make a list of all the most unique ideas for new uses for nitrate and cacao.

(continued on next page)

Idea No. 14 continued:

Using Strategy: No. 9, Examples of change

1. How has the way of life of the Indians been changed by colonizers?
2. How could the jungle regions along the Amazon be changed?

Using Strategy: No. 10, Organized-random search

1. If you were the head of the Pan American Union, what would you do to unify South America?
2. What progress has been reported by Peace Corps workers who have been in South America?

Using Strategy: No. 11, Examples of habit

1. How are farming methods the same in some places now as they were when the Spaniards first came to South America?
2. Why do you think some Indians live much the same today as they did 400 years ago?

Using Strategy: No. 14, Intuitive expression

1. What sights and sounds did Bolivar experience in his march over the Andes?
2. What emotions (feelings) would you have experienced if you had been one of the Incas at the time of Pizarro's conquest?

Using Strategy: No. 15, Process of invention

1. How did the Butaanan Institute in Brazil develop?
2. How did nitrate processing in Chile come about?

Using Strategy: No. 16, Adjustment to development

1. What mistake did Columbus make? What came of it?
2. What did Cabral do that relates his place in history to that of Columbus?

Using Strategy: No. 17, Study creative people

1. How did personal and social discomfort and maladjustment lead to the building of the new capital, Brasilia?

Using Strategy: No. 18, Interact with past knowledge

1. Use information collected to make graphs of industrial growth in South America.
2. Make charts showing climate zones of South America.

(continued on next page)

Idea No. 14 continued:

Using Strategy: No. 19, Evaluate situations

1. What if a new system of transportation were developed in South America that could surmount all present difficulties?
2. If you were chosen as a member of a committee on education in South America and your goal is to educate all of the people of South America, what changes would you propose?

Using Strategy: No. 23, Visualization skill

1. If you were a footprint on the soil of South America, what tales could you tell?

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Idea No. 15

To Develop: Flexibility

Through: Language Arts; Social Studies

Using: Strategies
No. 2 - Analogies
No. 5 - Provocative questions

Have you ever been trapped? People get trapped in floods, in burning buildings, by snowstorms, in quicksand, and in various other ways. Animals get trapped in landslides, in forest fires, and by trappers in many different ways. When you think about it, there are many different kinds of things in the world that get trapped besides people and animals. For example, water get trapped in sponges and rain barrels. See how many different kinds of traps (natural and unnatural) you can think of for the following items:

1. flies
2. syrup
3. music
4. heat
5. sunshine
6. smoke
7. laughter
8. time
9. ideas
10. emptiness

Which of the above items would you most like to capture or to have captured for you?

If you manage to trap it, how long will it remain the way you want it to be? Why?

Idea No. 21

To Develop: Originality; Curiosity

Through: Language Arts

Using: Strategies
No. 14 - Intuitive expression
No. 23 - Visualization skill

In this lesson the teacher introduced the class to a form of Japanese poetry which is called Haiku. The entire poem is written with only 17 syllables. The first line must contain 5 syllables, the second line 7, and the third line 5. If your paper is narrow, you may divide the middle line into 2 parts, one containing 3 syllables and the other 4. The lines may rhyme, but it is not necessary. There is no pattern of accent as in our poems. Writing Haiku is like painting a picture to fit a frame of a certain size, shape, and color. Then the teacher asked the children to think of some unique experience or scene that they recall with particular feeling and write a Japanese Haiku poem about it. The following instructions were given for their poetry writing:

1. State the theme of your idea.
2. Give an idea of the location of the scene you wish to paint.
3. Use only a word or two to suggest or imply which season of the year you have in mind.
4. Use only 5 syllables in the first line, 7 in the second, 5 in the third.

The teacher might read this example of a Haiku:

"The cabin is small
in the vast whiteness. Only
the smoke reveals it".

Each pupil was asked to read his or her Haiku while the class wondered about and attempted to deduce the theme, location, and time of year of the expressed experience.

Idea No. 30

To Develop: Fluency; Flexibility

Through: Language Arts

Using: Strategies
No. 6 - Attribute listing

Because it was apparent that many children in this low-achievers class had acute perceptual difficulties, the objective of this lesson involved improvement of the child's ability to perceive as well as to discriminate accurately and readily. Each child was instructed to look at some common object in the classroom as his pencil and to give one word to describe it. At first visual properties were reported: red, blue, long, short. Then the sensory properties were given such as: light, smooth, soft, flexible, spongy end, neither cold nor warm, etc. The interest accelerated and the children were encouraged to make as long a list as they could of all the different possible words that describe a pencil. They were then asked to list various uses of the pencil. The class made a list of 59 different uses for a pencil by the end of the lesson.

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Idea No. 31

To Develop: Preference for Complexity; Originality

Through: Language Arts

Using: Strategies
No. 10 - Organized-random search
No. 18 - Interact with past knowledge
No. 23 - Visualization skill

The teacher suggested that each child design his own scrabble game. Using 1/2" graph paper each child prepared his own scrabble board according to his ability to handle complicated patterns, knowlege and scope of spelling skills. After the scrabble games had been completed and shared, word groups were outlined with crayons in order to produce a design. This game gave children an opportunity to develop their spelling as well as various dictionery skills. Example:

```
          RUN
     LABOR A
     O  A C
     V  TACK
  MALE
  A
MOONLIGHT
```

Idea No. 34

To Develop: Fluency

Through: Social Studies

Using: Strategies
No. 6 - Attribute listing
No. 17 - Study creative people
No. 19 - Evaluate situations

A lesson in the Weekly Reader involved a study of the song, "America". After a careful discussion of the song's significance, the teacher asked the questions, "How long a list can we made of the qualities of a good American?" Think of all the qualities you can. The teacher then listed historical figures at the board and asked the children to think about each person and to decide whether or not he could be described by the qualities already listed. Inventors and discoverers were named and in the discussion of their qualities attention was called to the fact that such people were likely to have different ways of thinking. This led to a comparison of traits of highly creative individuals with other kinds of people and the contribution they make to their country. This stimulated considerable interest in further investigation of biographical reading related to people with high creative ability.

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Idea No. 35

To Develop: Curiosity; Preference for Complexity

Through: Social Studies

Using: Strategies
No. 5 - Provocative questions
No. 19 - Evaluate situations
No. 20 - Receptive to surprise

The Social Studies program involving the early explorers, their discovery of the Americas, and the settling of Canada and North America continually reiterates the westward movement from Europe to the Americas - from the Eastern coasts to the western coasts. One of the children asked this surprising and provocative question: "Why was exploration and settlement of the new world always a movement from east to west? Why weren't the Americas also explored from Asia eastward?"

(Continued on next page)

Idea No. 35 continued:

The class spent three social studies' periods in discussion of all the reasons possible for the "strange" phenomenon. Standards and customs of the Eastern and Western civilizations were compared. The types of colonial governments guaranteed by the exploring nations were discussed, and the freedoms which bred free thinking, as well as the education of young men and boys, were compared with present day practices. Finally, comparisons were made of eastern and western religions, so that comparisons, evaluations, and discussions were encountered, challenged, accepted and rejected by the group. By this confrontation with a provocative questions from a pupil and a teacher alert to its significance, the children had the satisfaction of dealing spontaneously with a complex problem and resolving some of the issues.

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Idea No. 36

To Develop:	Curiosity; Flexibility
Through:	Social Studies
Using:	Strategies No. 5 - Provocative questions No. 6 - Attribute listing No. 19 - Evaluate situations

This class requested an opportunity to discuss the creative problem-solving process and they were allowed to select a moderator to determine major areas of concentration, etc. On the following day the discussion opened with a listing of the many different abilities or characteristics of Creative Thinking. The children indirectly touched on the following aspects of the process:
1. Fluency, 2. Flexibility, 3. Originality

The discussion moderator asked the children to evaluate the importance of each of these components in the process. Next he asked the group to state examples of different kinds of situations in which the whole class or individual pupils had recently been involved in creative thinking. They related creative approaches to school problems, home life, such as adapting common objects to new and practical uses, etc. They also talked about the role that creative pRoblem-solving might play in occupational success, marriage, in making friends, and in many other different walks of life.

Idea No. 39

To Develop: Curiosity

Through: Social Studies

Using: Strategies
No. 1 - Paradoxes
No. 18 - Interact with past knowledge
No. 20 - Receptive to surprise

At the end of a unit studying political cartoons with humorous captions, the class was asked to make some application of the principles learned. A hypothetical meeting of pairs of paradoxical characters was suggested and the students were asked, "Let's see if we can explore and wonder what kind of conversation might have taken place between these two characters...."

Nathan Hale and Benedict Arnold
Eisenhower and Kruschev
Lyndon Johnson and Robert Kennedy

The students were highly motivated and eager to tell their ideas. As the children recalled previously acquired information about these characters they transformed it into an imaginative oral conversation. This technique is most effective as a review or culminating activity about people and events in history.

Idea No. 40

To Develop: Fluency; Originality

Through: Science

Using: Strategies
No. 2 - Analogies
No. 6 - Attribute listing
No. 14 - Intuitive expression

As the class approached the study of rivers in their science text, the teacher asked the children to list all the relevant ideas they could think of about the qualities, characteristics, and activities of rivers in general. A long list of ideas was collected, including single adjectives, phrases, sentences, sentence groups, etc. From this background of description, the teacher asked the children to think about the qualities of rivers of all kinds and suggest some other thing that a river reminded them of or something it was in some way like. They were asked to close their eyes to help them reflect upon a view or experience that would help them think of a special or unique comparison that no one else might think of........ "like a winding ribbon", "like a bubbling teapot", etc. Many new and novel ideas were offered and collected into a "treasure chest" of similes that could be referred to later when the class would be involved in poetry or creative prose writing.

Idea No. 43

To develop: Originality

Through: Art, Arithmetic

Using: Strategies
No. 4 - Thinking of possibles
No. 14 - Allowing for intuitive expression
No. 23 - Visualization skill

Prior to the art activity the class had made fraction wheels from different colored construction paper. (If a wheel was divided into fifths, red was chosen as the color - blue was used for fourths, etc.) These wheels were then cut into their fractional parts. The following fractions were used: 1/8, 1/6, 1/2, 1/4, 1/3, 1/12, 1/5, 1/10. As an arithmetic exercise these fractional parts were arranged on a wheel, and adding and subtracting like and unlike parts followed. The children were then asked to use the colored fractional pieces to plan and arrange an interesting and unusual pattern or design of as many pieces as they wished in some special way that was pleasing to them. When the arrangement was satisfying to the child, the pieces were pasted onto a sheet of 9" x 12" or 12" x 18" manilla paper. Each child was then asked to think up some unusual name for the abstraction that would represent something of his own feeling to the color and design.

Idea No. 44

To develop: Curiosity, Elaboration

Through: Arithmetic, Art

Using: Strategies
No. 20 - Receptive to surprise
No. 23 - Visualization skill

From several large square sheets of colored construction paper the children cut proportionate parts which they labeled 1/4, 1/8, 1/12, etc. Then they explored arrangements of these proportionate parts into into patterns which resembled physical objects or abstract forms. The variously shaped, colored papers formed interesting and pleasing designs which exemplified more extensive planning and a production of detailed steps than would the simple fraction wheels. As the children produced the pictures, their curiosity was stimulated, and they asked if they could "add" the fraction parts for an answer which could be used to name their designs. Example: If a child had clipped 1/8, 1/6, 1/4, 1/2, his design might be called, "The 1/24 Story". All of the children then began to add the fractions to their pictures. Those who needed help placed their problems on the board, and the class worked together on their solutions.

Idea No. 45

To develop: Flexibility

Through: Arithmetic

Using: Strategies
No. 4 - Thinking of possibles
No. 23 - Visualization skill

The objective for this fifth grade arithmetic lesson on the study of line segments involved the understanding of the terms: parallel, vertical, horizontal, diagonal and perpendicular. The teacher handed out 1" square graph paper and suggested that the pupils place inside each square two straight lines so that in each of these squares the two lines would be placed in as many different relationships with each other as possible. No two pairs of lines should be placed in the same pattern. Color coding was added on the plan for each square so that all vertical lines were blue, all horizontal lines green, etc. The pupils were told to visualize as many different ways as they could for placing lines within the squares.

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Idea No. 46

To develop: Preference for Complexity, Fluency

Through: Arithmetic

Using: Strategies
No. 4 - Thinking of possibles
No.10 - Organized-random search
No.18 - Interact with past knowledge

The teacher's objective was to involve the children in drill of the four mathematical processes. She requested that by using all four arithmetic processes and as many numbers as possible each child would set up a complex problem whose answer would be 27. Results included problems containing as many as 20 to 50 separate numbers. Examples:

$$3 + 5 - 2 \times 50 - 30 - 10 \div 80 + 27 - 2 = 27$$

$$3 + 5 + 50 - 40 \div 2 \times 10 - 40 + 50 \div 10 + 30 - 13 = 27$$

One valuable outcome of this idea was the fact that as such problems are placed on a chalk board ample opportunity was allowed for review and discussion of basic number facts.

Idea No. 49

To Develop: Willingness to Take Risks, Originality

Through: Social Studies

Using: Strategies
No. 2 - Analogies
No. 16 - Adjustment to Development
No. 18 - Interact with Past Knowledge

Pupils alone or in small groups were asked to guess how to act out an historic event in such a manner that the rest of the class could guess what event it was. They had a short time to prepare. They used waste baskets for cannons; fingers for guns; eyes blinking for lights; chairs as boats, cars, planes; and each other for all manner of things. They demonstrated imagination, spontaneity, and originality in creating a new way of expressing their knowledge of historical events.

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Idea No. 50

To Develop: Curiosity, Flexibility

Through: Social Studies

Using: Strategies
No. 9 - Examples of Change
No. 10 - Organized Random Search
No. 19 - Evaluate Situations

Before studying Egypt, the class was asked to make a list of all the different things they could think of that affected their lives in the place where they lived. They thought of such things as education, church, recreation, sports, entertainment, government, food, clothing, transportation, etc. On the blackboard they listed over fifty things that affected their lives. Then they were asked to imagine that their family was suddenly transferred to Egypt and to explore how these things would affect their lives in Egypt. In what ways would their daily lives be changed? Each child compiled a booklet in which he or she wrote reports of his life as a 12-year old in Egypt, using encyclopedias, library books, film strips, Junior Scholastic, National Georgraphic, etc. The project stimulated real interest in the study of Egypt.

Idea No. 53

To Develop: Curiosity

Through: Science

Using: Strategies
No. 3 - Sensing Deficiencies
No. 5 - Provocative Questions
No. 7 - Exploring Mystery of Things

The class was given a kit from the Learning Laboratory containing magnets, iron filings, and compasses to help them learn by exploring and discovering the answers to some questions:
Where are the poles of a disc magnet? How is a magnet made?
What would happen if there were no magnetism? etc.
By individual discovery each child was able to observe characteristics of magnetism. They developed many theories relating magnetism to gravity.

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Idea No. 54

To Develop: Curiosity

Through: Social Studies

Using: Strategies
No. 5 - Provocative Questions
No. 19 - Evaluate Situations

The class used films, film strips, reference books, library books, pictures, newspapers, maps, magazines, diagrams, etc. to explore the question: What are the reasons for Africa's changing from a "dark continent" to a place of importance? Work was done individually and in groups. At the close of the unit group reviews were given on a particular geographical area of their choice. One group used a cardboard boat explaining their chosen geographical area as they took a trip down the Nile. Each review was followed by a question period. Considerable understanding of the relationship of Africa to world affairs was gained through the study of this question.

Idea No. 62

To Develop: Flexibility, Originality

Through: Language Arts

Using: Strategies
No. 2 - Analogies
No. 6 - Attribute Listing
No. 14 - Intuitive Expression

The class discussed and listed as many descriptive words as possible to terms listed on the blackboard. They were given a worksheet and asked to list as many different and unusual words as they could think of that described:

a dish breaking
children sliding on snow
an airplane flying over the school
a foggy night
a haunted house

Many of the children came up with rather unique descriptions. We discussed the great variety of descriptive terms and enjoyed especially the unusual and most imaginative.

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Idea No. 63

To Develop: Originality, Elaboration

Through: Language Arts

Using: Strategies
No. 8 - Reinforcing Originality
No. 14 - Intuitive Expression
No. 22 - Creative Listening Skill

The class listened to a passage in the book LAUGH AND CRY by Jerrold Beim (page 42) which tells the effects of anger upon the person who is angry. The children were asked to listen creatively and then to express the same idea in their own original manner by producing something on their own or stretching or expanding upon the author's story. The class produced:

7 poems
6 original stories
1 play
16 paragraphs
1 booklet
20 artistic interpretations (1 surrealistic)

Interesting and original ideas were generated.

INNOVATION REPORT FORM

School ____________________ Grade-level ____________________

A. - THIS IS HOW I USED IDEA NO. ____ ON PAGE ____.

B. - MATERIALS USED: (Films, books, etc.) ____________________

C. - RESULTS (This is what happened) ____________________

D. - MODEL CLASSIFICATION: (optional)

To Develop: Thinking Process(es)	Through: Subject Area	Using: Teaching Strategy(ies)

- -

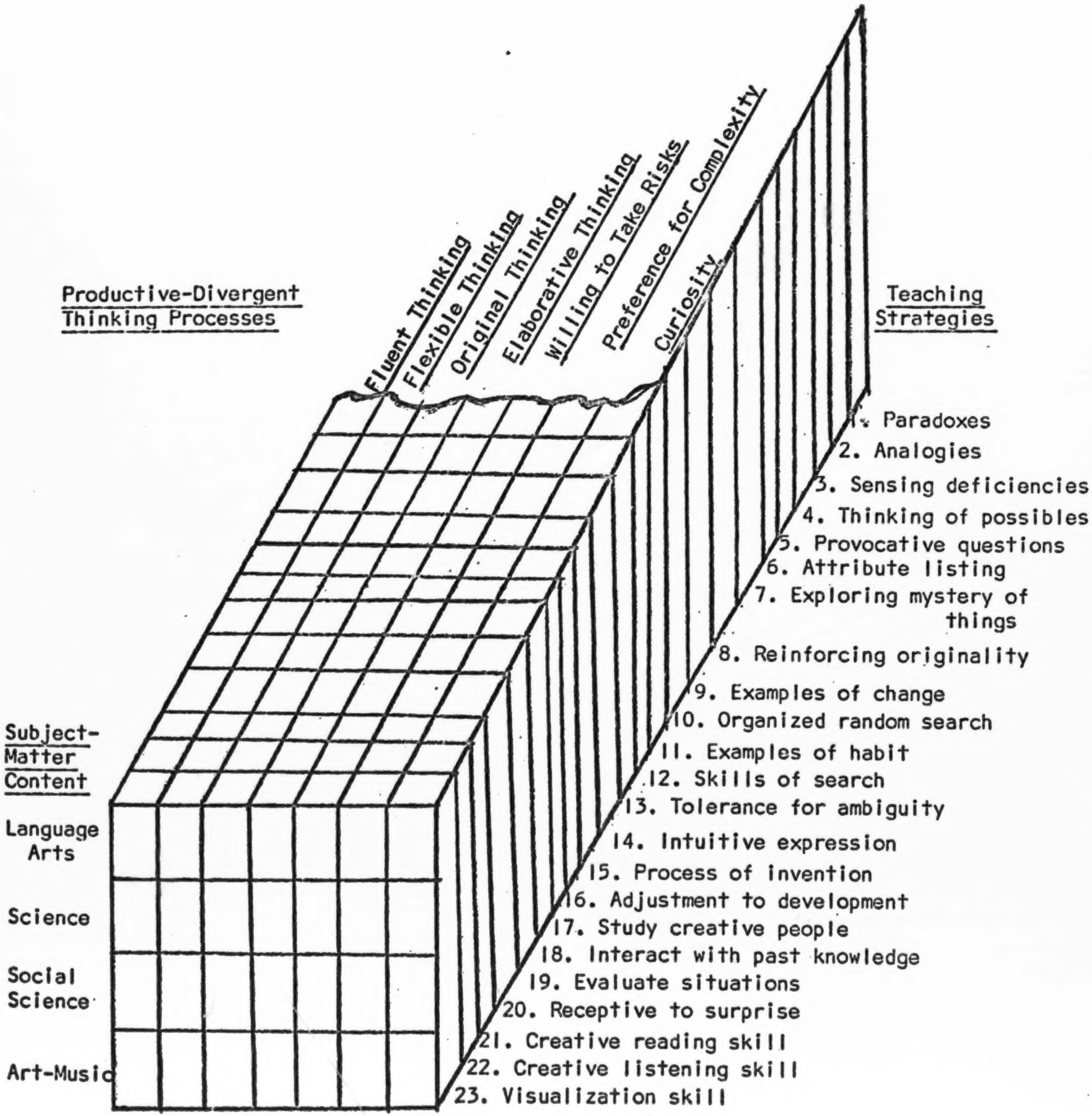
A. - THIS IS A NEW IDEA I SHOULD LIKE TO REPORT ____________________

B. - MATERIALS USED: (Films, books, etc.) ____________________

C. - RESULTS - (This is what happened) ____________________

D. - MODEL CLASSIFICATION (optional)

To Develop: Thinking Process(es)	Through: Subject Area	Using: Teaching Strategy(ies)


Productive-Divergent
Thinking Processes
Fluent Thinking
Flexible Thinking
Original Thinking
Elaborative Thinking
Willing to Take Risks
Preference for Complexity
Curiosity
Teaching
Strategies
1. Paradoxes
2. Analogies
3. Sensing deficiencies
4. Thinking of possibles
5. Provocative questions
6. Attribute listing
7. Exploring mystery of things
8. Reinforcing originality
9. Examples of change
10. Organized random search
11. Examples of habit
12. Skills of search
13. Tolerance for ambiguity
14. Intuitive expression
15. Process of invention
16. Adjustment to development
17. Study creative people
18. Interact with past knowledge
19. Evaluate situations
20. Receptive to surprise
21. Creative reading skill
22. Creative listening skill
23. Visualization skill
Subject-
Matter
Content
Language
Arts
Science
Social
Science
Art-Music

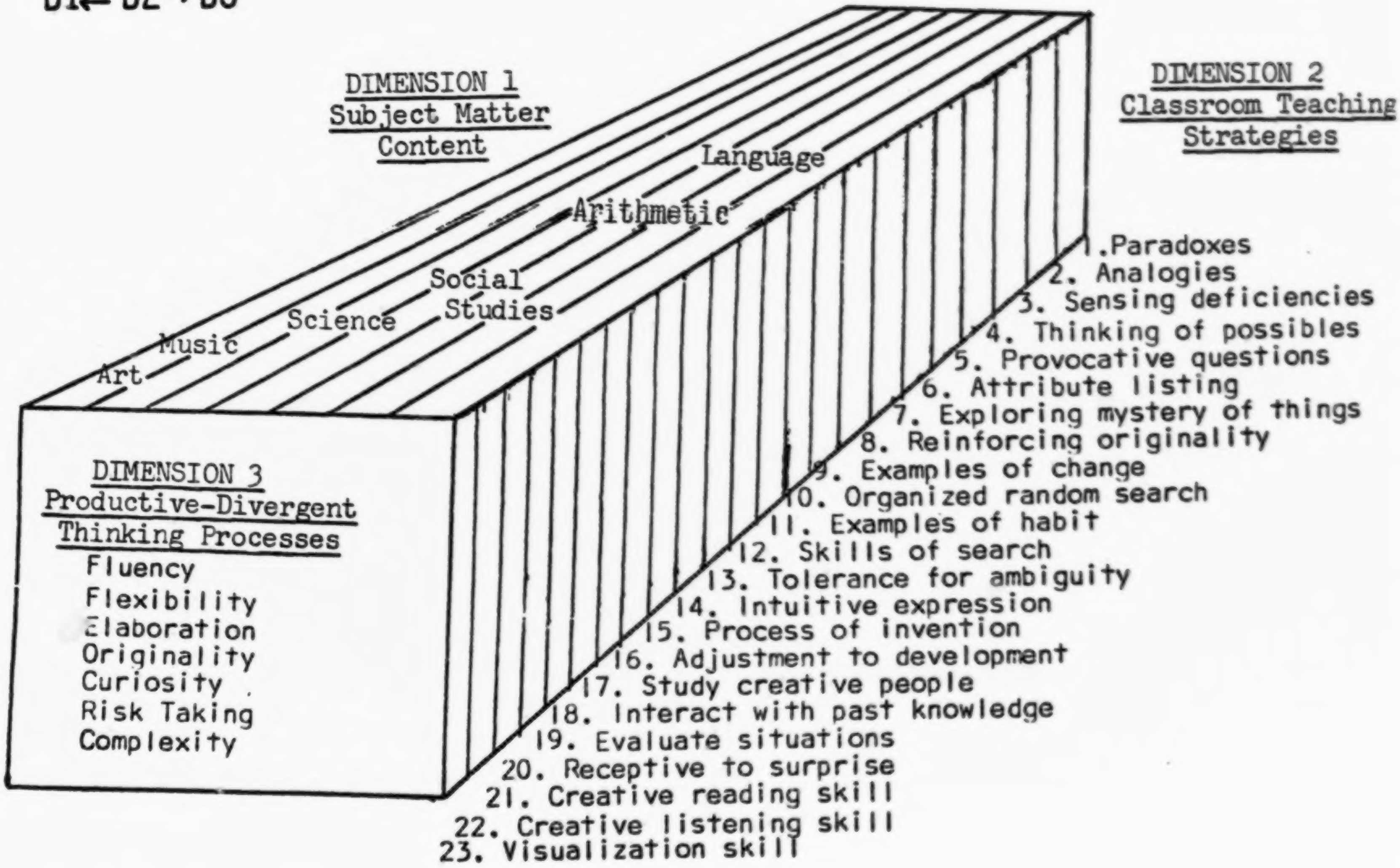
MODEL FOR THE TEACHING OF PRODUCTIVE-DIVERGENT THINKING THROUGH SUBJECT-MATTER CONTENT

TEACHING STRATEGIES

NAME	MEANING
No. 1 - PARADOXES	Situation opposed to common sense Self-contradictory statement or observation
No. 2 - ANALOGIES	Situations of likeness Similarities between things
No. 3 - SENSING DEFICIENCIES	Gaps in knowledge Missing links in information
No. 4 - THINKING OF POSSIBLES	Guessing or forming hypotheses Thinking of probabilities
No. 5 - PROVOCATIVE QUESTIONS	Inquiry to bring forth meaning Incite knowledge exploration
No. 6 - ATTRIBUTE LISTING	Inherent properties Conventional symbols or identities
No. 7 - EXPLORING MYSTERY OF THINGS	Detective work on unfamiliar knowledge Examine unnatural phenomena
No. 8 - REINFORCING ORIGINALITY	Rewarding original thinking Strengthen unlikely but relevant responses
No. 9 - EXAMPLES OF CHANGE	Demonstrate the dynamics of things Provide opportunities for making alterations, modifications, or substitutions
No.10 - ORGANIZED RANDOM SEARCH	Use a familiar structure to lead at random to another structure Case studies from which new courses of action are devised
No.11 - EXAMPLES OF HABIT	Discuss the effects of habit-bound thinking Build a sensitivity against rigidity in ideas
No.12 - SKILLS OF SEARCH	Consider ways something has been done before Trial and error on new ways Control experimental conditions
No.13 - TOLERANCE FOR AMBIGUITY	Provide encounters which challenge thinking Pose open-ended situations
No.14 - INTUITIVE EXPRESSION	Skill of expressing emotion Feeling about things through all of the senses
No.15 - PROCESS OF INVENTION	Steps of problem-solving leading to invention Study the incubation process leading to insight
No.16 - ADJUSTMENT TO DEVELOPMENT	Examine how failures, or accidents, have paid off Learn how to learn from mistakes
No.17 - STUDY CREATIVE PEOPLE	Analyze traits of eminently creative people Study the process which has led to creation
No.18 - INTERACT WITH PAST KNOWLEDGE	Nurture ideas from previously stored knowledge Allow opportunities to toy with information already acquired
No.19 - EVALUATE SITUATIONS	Extrapolate from the results of ideas and actions Deciding upon solutions in terms of their consequences and implications
No.20 - RECEPTIVE TO SURPRISE	Capitalize upon unexpected ideas Alert to the significance of novel thoughts
No.21 - CREATIVE READING SKILL	Learn the skill of idea generation by reading Develop a utilitarian mind-set for information
No.22 - CREATIVE LISTENING SKILL	Learn the skill of idea generation by listening Listen for information which allows one thing to lead to another
No.23 - VISUALIZATION SKILL	Express ideas in three-dimensional forms Practice describing views from unaccustomed vantage points

MODEL FOR TEACHING PRODUCTIVE-DIVERGENT THINKING

D1⇄D2→D3


DIMENSION 1
Subject Matter
Content
Language
Arithmetic
Social
Studies
Science
Music
Art
DIMENSION 2
Classroom Teaching
Strategies
1. Paradoxes
2. Analogies
3. Sensing deficiencies
4. Thinking of possibles
5. Provocative questions
6. Attribute listing
7. Exploring mystery of things
8. Reinforcing originality
9. Examples of change
10. Organized random search
11. Examples of habit
12. Skills of search
13. Tolerance for ambiguity
14. Intuitive expression
15. Process of invention
16. Adjustment to development
17. Study creative people
18. Interact with past knowledge
19. Evaluate situations
20. Receptive to surprise
21. Creative reading skill
22. Creative listening skill
23. Visualization skill
DIMENSION 3
Productive-Divergent
Thinking Processes
Fluency
Flexibility
Elaboration
Originality
Curiosity
Risk Taking
Complexity

TEACHING STRATEGIES

NAME	MEANING
No. 1 - PARADOXES	Situation opposed to common sense Self-contradictory statement or observation
No. 2 - ANALOGIES	Situations of likeness Similarities between things
No. 3 - SENSING DEFICIENCIES	Gaps in knowledge Missing links in information
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